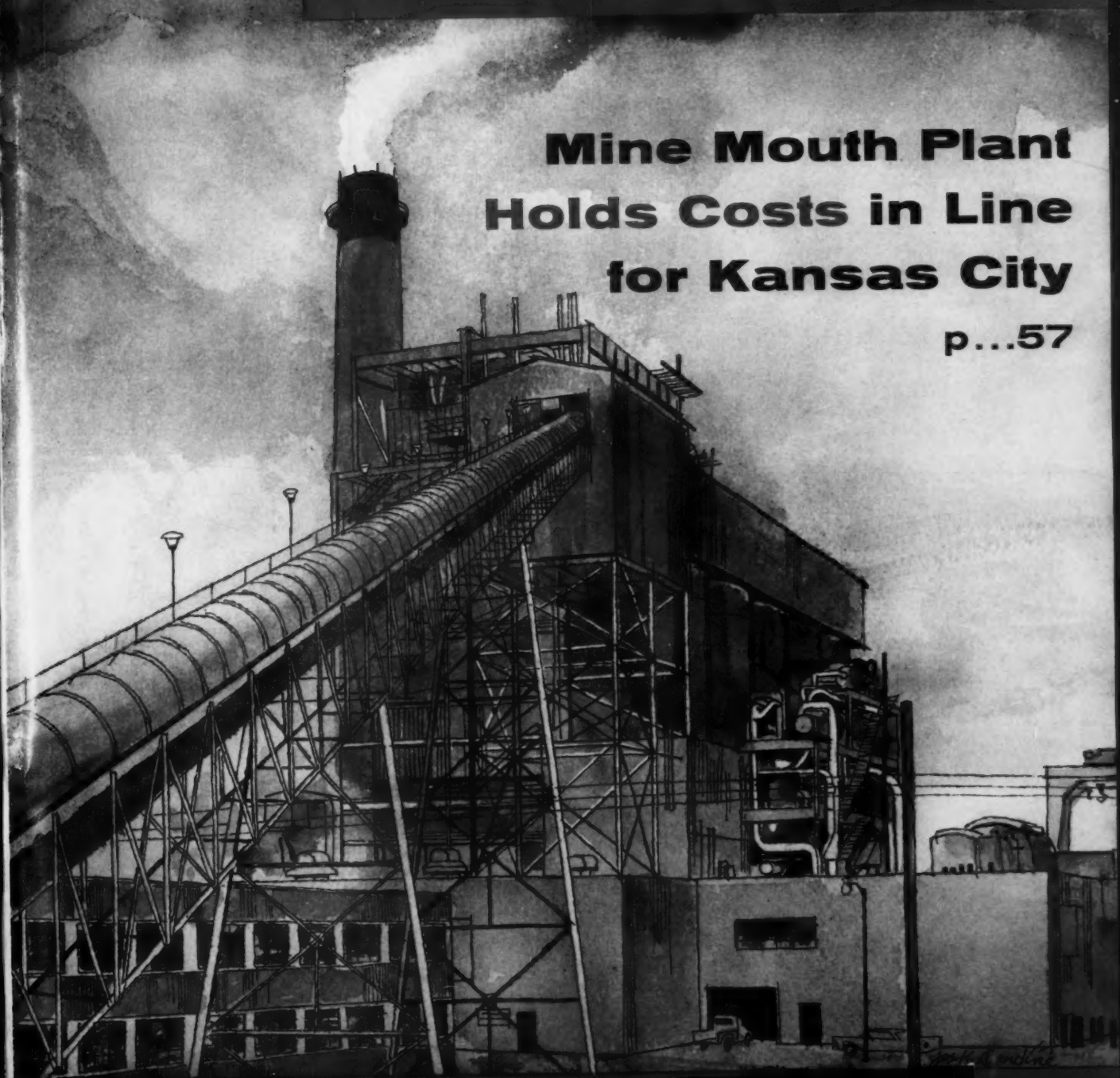
The Electrical Industry's Weekly Magazine

May 4, 1959

Electrical World

Price 50 Cents

A McGraw-Hill Publication



Mine Mouth Plant Holds Costs in Line for Kansas City

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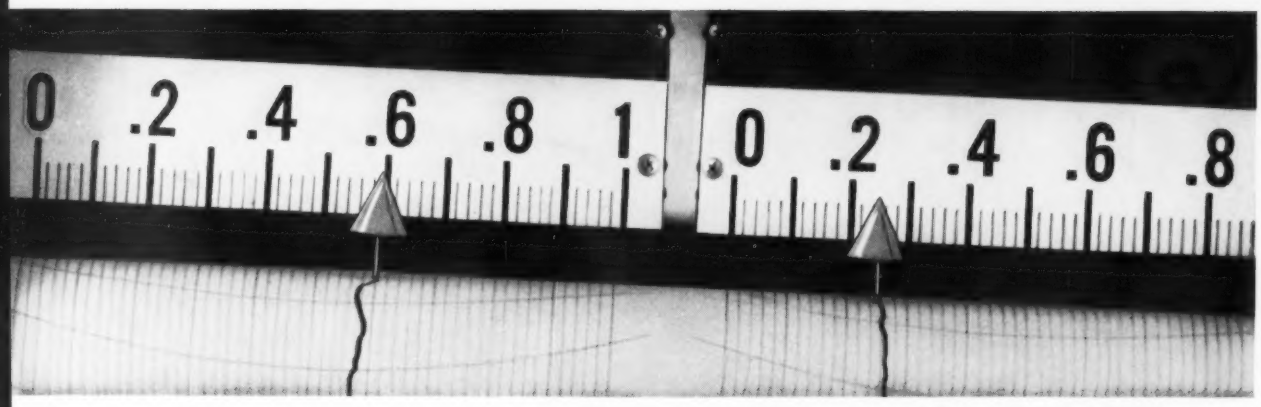
plots twin records . . .



This new General Electric Type CH-37 duplex recorder plots two complete electrical records side by side on one ten-inch-wide chart. No more reading separate charts . . . now related functions such as watts and vars, volts and frequency, d-c amperes and speed can be measured and recorded with 1% accuracy on ***one strip chart.*** The CH-37 saves valuable panel space . . . it's only 15 inches wide by $16\frac{1}{16}$ inches high and semi-flush mounted. It features ***throw-away inkwell,*** multiple chart speeds, chart supply indicator, fluorescent-lighted chart face and gasket-sealed door with key lock. Companion models include a new narrow-range CH frequency recorder, self-contained and with accuracy of ±.05 cycles and range of only 58–62 cycles . . . and the CH-7 hook-on volt-ammeter, for accurate recording of dip and peaks on exacting maintenance jobs. Get the complete story on General Electric's line of CH recorders. Just call your nearby G-E Apparatus Sales Engineer or write direct to Section 592–201, General Electric Company, Schenectady 5, N. Y.

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Switchboard and panel instruments, electric recorders and controllers, pyrometers, timing devices, speed and color measurement, laboratory test instruments.

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GENERAL ELECTRIC

Electrical World

Vol. 151, No. 18 MAY 4, 1959

Published for 85 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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Are You Getting The Maximum Life out of Your Paper Cables?

The life of paper-insulated cable is seriously compromised if moisture enters the wall of insulation. That is why a lead sheath is employed. By providing a perfect seal, it prevents moisture from finding its way into the cable. Of course, in order for the sheath to do its job, it must, itself, remain intact.

G. N. Everest
Factory Sales Manager

A study of cable service records has shown that a large percentage of paper cable failures are caused by failure of the sheath. Among others, there are two basic causes of sheath failure. One is electrolytic corrosion; the other is mechanical damage during installation.

Realizing this, Okonite research engineers developed a covering for lead that would not only prevent damage during installation, but, also, would prevent corrosion. This covering was introduced in 1933. We called it Okosheath Protective Covering . . . "OPC" for short. Proof that OPC prolongs the life of lead sheaths lies in the fact that over a quarter of a century ago, since its introduction, not one corrosion failure has been reported.

OPC consists of (1) an Okoprene-impregnated tape which is thoroughly bonded to the lead . . . no chance for corrosive elements to travel next to the sheath, (2) an insulating, corrosion-resistant wall of Okoprene, (3) two outer layers of Okoprene-impregnated tape for additional mechanical protection, and (4) a wax-mica finish to facilitate easier pulling into ducts.

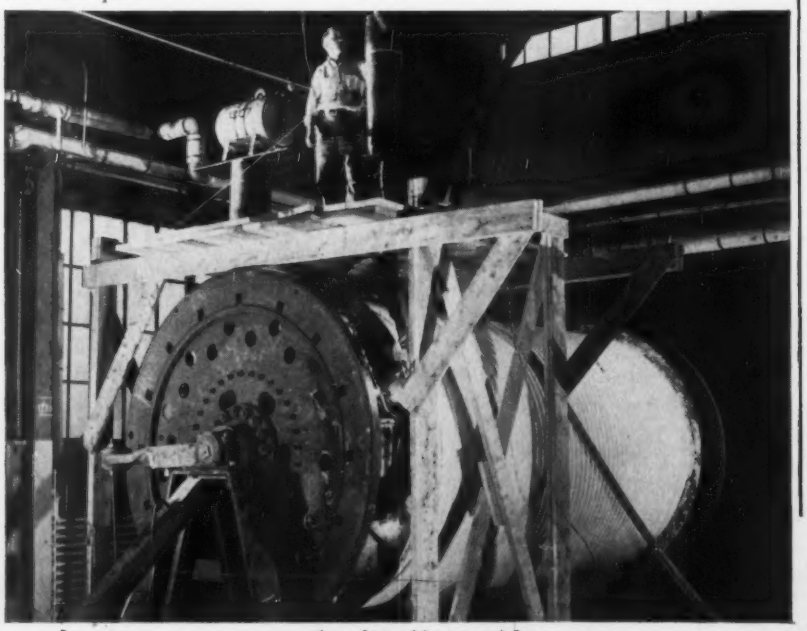
Cross Section of
Okosheath Protective Covering

Okoprene is an exclusive Okonite compound. A neoprene base material, it conforms to ASTM requirements . . . is flame, oil, and chemical-resistant. It is mechanically strong, ages well, and possesses the stable insulating qualities required to prevent electrolysis. As a component of OPC, Okoprene is applied to the cable by Okonite's unique strip-insulating process. This assures a wall of absolutely uniform thickness —no thin spots, no areas that are less strong than others.

Some Environments Pose Special Problems

To suit special environments, Okonite paper cable is often supplied with a thermoplastic covering — Okoseal (polyvinyl chloride base) or Okolene (polyethylene base). These compounds provide excellent sheath protection where extraordinary chemicals will be encountered . . . for example, petrochemical plants.

Submarine cables, also, require special protection for the lead sheath. In addition, long unspliced lengths are usually desirable. Okonite, with its extensive experience and special manufacturing facilities, is well equipped to handle the difficult problems of submarine cable manufacture.



. . . submarine cable, a specialty

1. The development of Okosheath Protective Covering and

2. a record of enviable success in solving other, challenging cable covering problems . . .

. . . two illustrations of Okonite's leadership . . . leadership that comes from skill in research, skill in manufacturing, and skill in application engineering. Achievements like these point to the fact that Okonite paper cables contain *added values*, values that are not written into specifications. Today, every good engineer I know is seeking ways to get the maximum value out of the money he invests for his company or client. The *added values* in Okonite paper cables provide an opportunity to get extra life and dependability out of electrical cable systems. As one engineer to another, I urge you to become better acquainted with the long range economy of Okonite paper cables.

If you have not received your copy of the new Okonite paper cable catalog, or if I can be of help to you with a current problem, please get in touch with me at The Okonite Company, Passaic, New Jersey.

6062

where there's electrical power . . . there's OKONITE CABLE

EEI Should Recognize Electric Car Potential

Admittedly we are in the developmental period for the modern electric car—that crucial period when help and cooperation are vitally needed.

Happily, the utilities are coming through. The first production model of Stinson's "Charles Town-About" was to come off the production line April 16. Stinson now has 95 firm orders from 62 utilities, and more are in the offing.

At least ten other firms are in various stages of planning and developing electric car models, and battery makers are taking a serious interest in developing their product to serve this promising new market.

As other improvements come, electric utilities will be well advised to keep abreast of progress and offer encouragement wherever possible. It is time, we believe, for the Edison Electric Institute to take official recognition of the electric car potential. Perhaps the newly named Sales Division of EEI should designate a committee to keep tabs on electric car progress, and suggest ways in which the industry may help develop, test, and market the electric cars. By starting early, the industry would be in a much better position to develop sound markets for this potentially great load builder.

Fischer Black

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ABP ELECTRICAL WORLD

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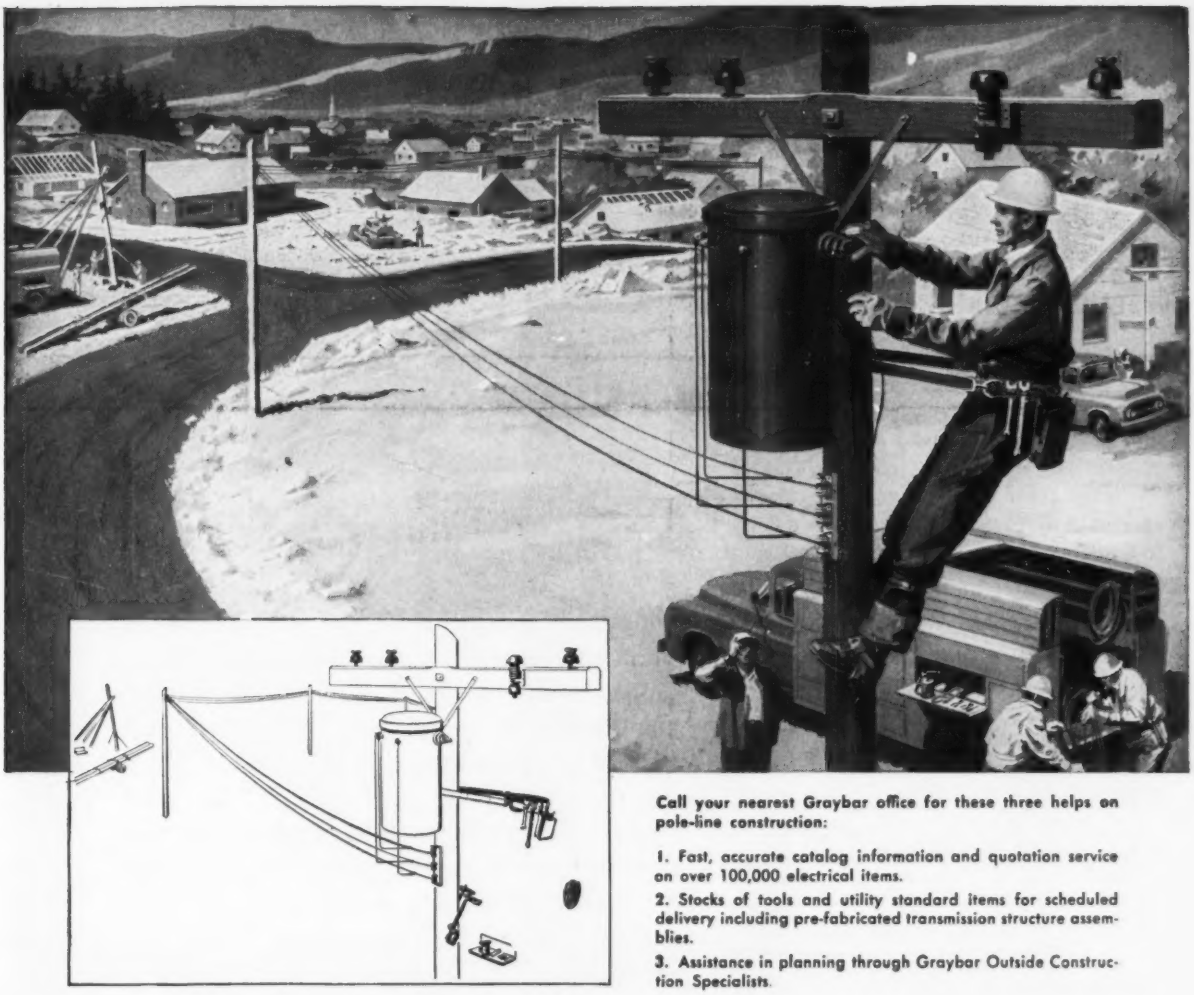

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- *bell mouth for ease of cable entrance.*
- *full range of conductor sizes.*
- *clear markings on barrel to indicate wire size etc.*
- *choice of one or two tools for all products.*
- *both hand and hydraulic tools.*
- *all three items applied with same tool—either hand or hydraulic.*
- *simple, fast application method.*

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"UTILI-TENSHUN" SPLICE

Illustrated above is a full tension splice, measuring approximately 6" in length for use on 1/0 ACSR cable. It is designed to overcome all those cumbersome application problems of bulky splices on ACSR cable. UTILI-TENSHUN's steel core grips steel cable strand, permits a small streamline construction that can be applied much faster and with fewer steps. You save money on every application. Simply expose steel core, insert and crimp. Most important . . . tensile strength is equal to the rated strength of the cable itself.

Individually packaged UTILI - TENSHUN Splices are marked with part numbers, crimp die sizes, wire sizes, which provide accessibility even with heavy gloves. Wire size range from #6 through 4/0 AWG.

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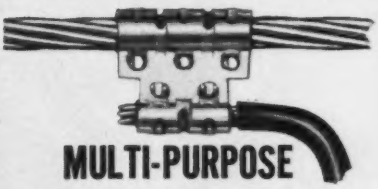
NEEDS

Now—save application time, installed costs, while greatly reducing your product and tool inventories. Standardize your splicing requirements on these three A-MP products —three items with the greatest versatility to do many, many different jobs. All three have been designed by A-MP engineers, specialists in your problems. All three have the same outstanding A-MP reliability.

AMP STEP DOWN "UTILI-SPLICE"

Here is the simplest way to step down your cable sizes. No extra parts or inserts, nothing to tighten, no bulky or heavy units. For any aluminum or copper combination, UTILI-SPLICE length is in proportion to the cable cross section. Positive wire stops eliminate centering problems assure proper insertion depth every time. Save time and money on every job. For positive electrical performance specify UTILI-SPLICE. Wire size range from #8 through 1/0 AWG.

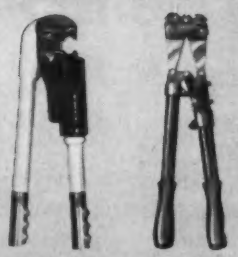
MULTI-PURPOSE AMP "UTILI-TAP"



This is the only tap on the market to convert from an easily handled open barrel construction to a permanent closed barrel attachment . . . nothing beats it for versatility. Use for a service drop, either at the pole end or the house end or use it for stirrup applications. Split barrels with locking tabs permit independent crimps without splitting or distortion. Dimple serrations in barrel increase tensile strength.

To simplify your tooling requirements, matching tools, hydraulic and hand, are designed to attach all three products.

Crimping dies are attached to tool head. Both feature light weight powerful construction. Positive crimp control assures same crimp every time.



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Exclusive Distributor For AMP Products To The Utility Industry

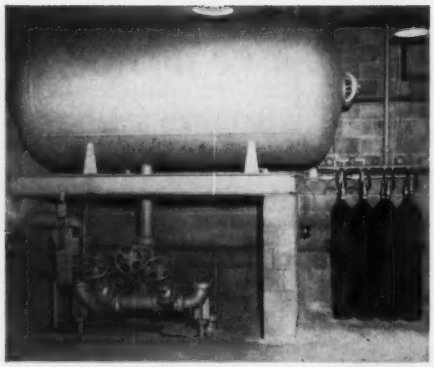
Grinnell Selfcon® Water Spray Systems

To bring the proven effectiveness of water spray protection to locations where adequate water supplies are not always available, Grinnell developed its Selfcon System.

This system consists of a water storage tank and cylinders of compressed nitrogen gas, safely located out of the hazard area, and connected by piping to the water spray nozzles in the area to be protected. Automatic fire detecting devices are connected back to the nitrogen cylinder releases.

Should fire break out, nitrogen is quickly released into the water tank, raising the pressure so that water is discharged from the spray nozzles with maximum extinguishing effect. The water capacity of the system provides a safety factor well in excess of extinguishing time.

An engineer from Grinnell's Fire Protection Division, which introduced water spray protection in America, will gladly explain more about the operation of this system. Contact Grinnell Company, Inc., Providence 1, R. I. Branches in principal cities.



Building located out of hazard area houses both water storage tank and pressurized nitrogen gas in cylinders.

Manufacturing, Engineering, and Installation of Fire Protection Systems since 1870

Long bow, utility pole or railroad tie—whatever the product—serviceability largely hinges on the method of preservation. Equally critical is the quality of the stock you start with...the raw material. Your wood investment is protected on two counts when you specify AMCRECO pressure treated products. First, a time-tested treating technique, confirmed by major industrial users coast to coast. Second, a 1,500,000-acre timber supply...vast and versatile enough to assure you highest quality grades regardless of your requirements or delivery deadline.

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Subsidiary of Union Bag-Camp Paper Corporation

Right off the Wire

No. 14 in a series

21. Simplex takes pleasure in extending an invitation to old friends and new to visit their Booth #1611 at the American Mining Congress Coal Show, Cleveland Public Auditorium, May 11th through May 14th.

&

22. A 600-passenger ocean liner which will run on hydrofoils is in the design stage.

&

23. The first rocket-camera has been used to photograph cloud formations over the Atlantic.

&

24. An electrostatic device can separate particles of different materials. It can sort flour milling stocks, separate grains of different minerals and distinguish between healthy and unhealthy seeds.

&

25. A new magnetic recording tape has a protective lamination over the oxide to prevent wear.

&

26. A solid electrolyte battery has been developed that is said to be suitable for commercial production.

&

27. There are now three large offices where individual desk telephones can be reached from the outside by direct dialing.

&

28. Mercury batteries reduce the weight of a clock radio, made especially for travelers, to less than three pounds.

&

29. Stereophonic radio has hitherto required both AM and FM for transmission. A new method uses AM only.

&

30. The light from a recently patented underwater flash bulb is of such brief duration that fish are not frightened by it.

31. Crevasses in glaciers or ice fields can be detected by a device that can be carried in an airplane. It measures the difference in heat radiation between solid and hollow ice and records on film.

&

32. Tissues, skin, veins, arteries and circulating blood are all realistically simulated in an imitation human body designed for first aid training.

&

33. A heating element for use in floors or walls is made of paper in which copper strips are embedded.

&

Further information on these news items and on Simplex cable is available from any Simplex office. Please be specific in your requests.

&

34. A patent for an acoustical method of stimulating the flow of oil wells has been issued. The sound waves will actually shatter rock.

&

35. For the first time, an airplane has been guided over land by a missile system using radar to scan a photograph of the terrain.

&

36. An attachment for a telephone intended for use by a number of people kills germs with ultraviolet light.

&

37. Electroluminescent panels that emit cool light from a flat glass plate are now made in six colors.

&

38. Entirely new principles of heating and cooling are used in a unit that keeps foods hot or cold. It is mounted on wheels, uses batteries for power and can be rolled anywhere in or out of the house.

39. Ticker tape is being projected on a screen with letters and figures two feet high at the New York Stock Exchange.

&

40. A method of bouncing short waves off man-made reflectors in the sky has been patented. It can be used for radio or television.

&

41. America's annual bill for corrosion is 6 billion dollars, according to recently revised figures. Simplex Wire & Cable Co. has prepared a bulletin on this expensive problem and the most effective means of combating it. Write for Bulletin 1033.

Thirty-eight years ago Simplex Wire & Cable Co. announced the TIREX line of rubber-jacketed and insulated cords and cables to the mining industry. These cables featured the Simplex developed "cured-in-lead" process which produced a dense, tough and yet highly flexible sheath. To an industry plagued by severe operating conditions, the TIREX line of power and control cables provided unmatched dependability and service life.

Today, manufactured with the same proven "cured-in-lead" process and embodying vastly improved insulating and jacketing compounds, Simplex TIREX is still the first choice wherever operating conditions are at their worst.

SIMPLEX WIRE & CABLE CO.
Cambridge, Massachusetts and
Newington, New Hampshire

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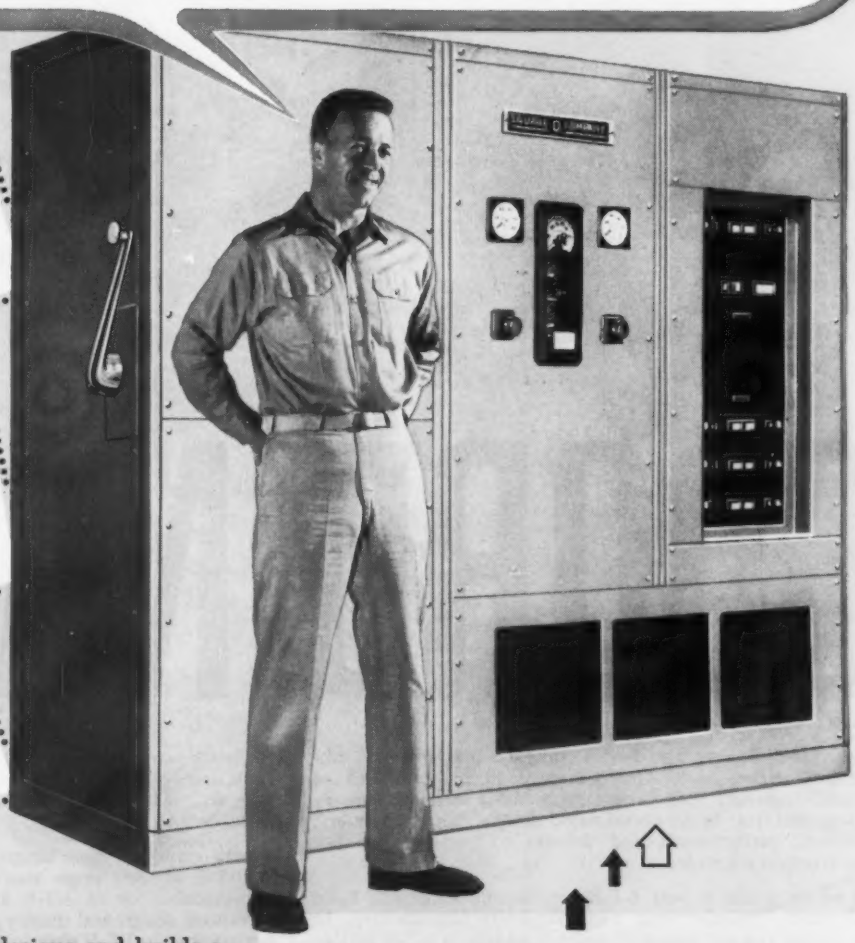
Highest quality cables for: Mining
Power & Lighting • Construction
Transportation • Communications
Signalling

Power-zOne UNIT SUBSTATIONS
HAVE EVERYTHING...INCLUDING COMPACTNESS!

Can be moved through normal commercial doorways

Save valuable space —can be placed against the wall

Capacities up to 300 KVA



• Square D designs and builds a complete line of substations for any application, indoor or outdoor—with dry or liquid-filled transformers—with large air-breakers or molded case breakers—with motor control units.

If you have any questions pertaining to substations, call in your Square D Field Engineer or write for literature describing space and cost saving with Square D's "*Power-zone*" design.

Address Square D Company, 6060 Rivard Street, Detroit 11, Michigan.

Power-zOne DESIGN PAYS OFF!

MINIMUM SIZE AND EASY HANDLING

- Only 79½" high, 36" deep and 94" wide
- All components front-accessible

EQUIPPED TO BEST FIT YOUR APPLICATION

- **High Voltage** • Air interrupter switch or oil cutouts, fused or unfused
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- **Low Voltage** • Molded case circuit breakers; QMB fusible switches and motor starters; metering equipment. Full 72" of panel space available for these devices

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

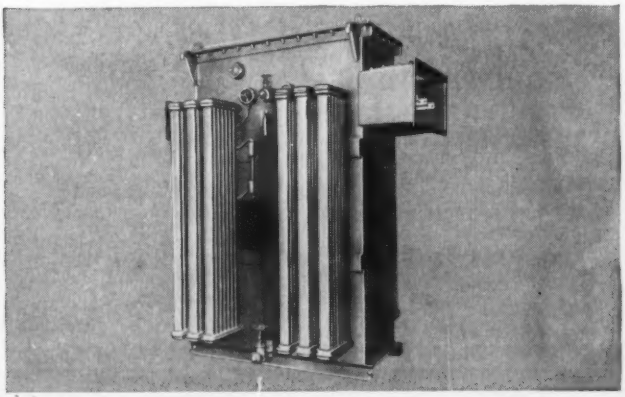
I-T-E CIRCUIT BREAKER COMPANY

COORDINATED

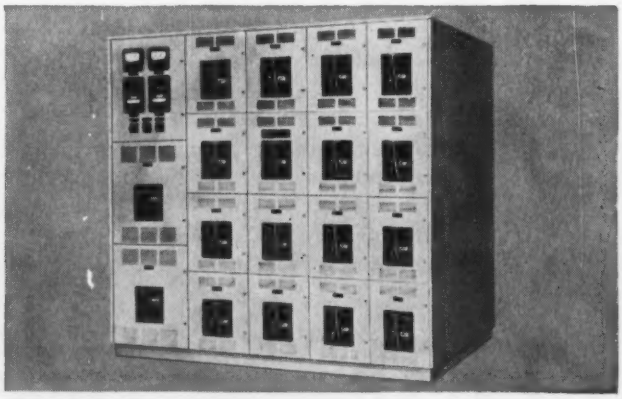
Only I-T-E designs and builds complete primary unit substations in one plant. And because engineers can work so closely together, you benefit from extra time-and-money saving features: better-coordinated designs, easier assembly, pretested performance, and delivery to match your own construction schedule.

At no extra cost to you, I-T-E can custom design and build substations to meet your own particular requirements. In every case you get the additional advantages of I-T-E switchgear . . . sturdier, safer and easier to operate. And I-T-E high-stress transformers incorporate extra protection from fault damage. I-T-E substations are available in all kva ratings and secondary voltages up to 13.8 kv., for indoor or outdoor installation.

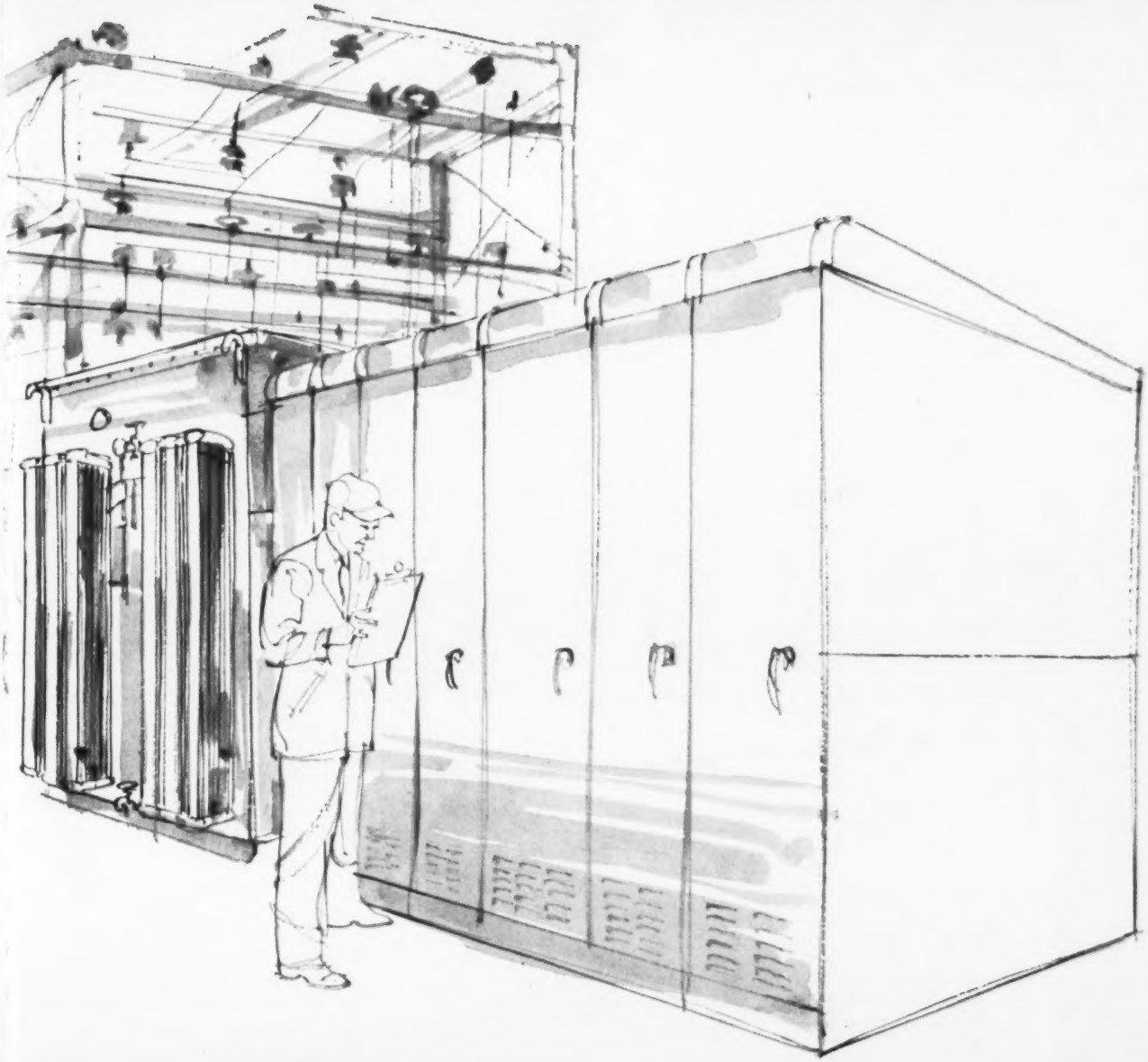
Today more and more electric utility companies are looking to I-T-E as their single source of supply for complete unit substations. For in I-T-E substations, too, they find the advanced design and quality construction to which they are accustomed in I-T-E electrical equipment. Equally important, I-T-E costs no more.

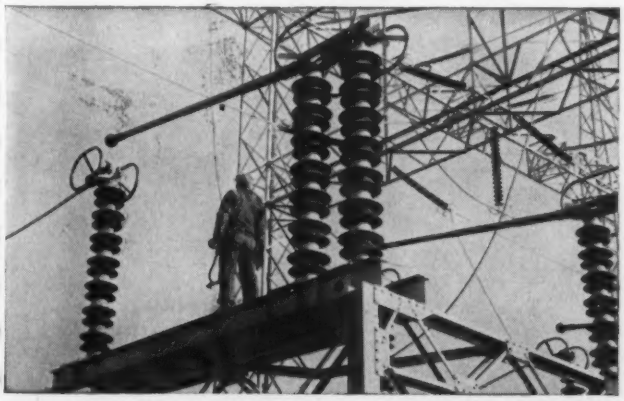


New designs, stronger construction. I-T-E substation transformers are available liquid-immersed or with ventilated dry type or sealed dry type construction. Ratings: liquid—112½ to 10,000 kva, up to 69 kv; dry ventilated—112½ to 3000 kva, up to 13.8 kv; dry sealed—300 to 3000 kva, up to 13.8 kv.



Manual quick-make means greater safety, extended contact life for I-T-E K-Line low-voltage switchgear. Expanded overcurrent trip provides maximum load flexibility. For added safety and convenience, K-Line circuit breakers can be moved to the test position or be disconnected with door closed.





Shrug off heavy fault currents. I-T-E disconnecting switches use heavy silver-to-copper jaw contacts with high thermal capacities to withstand heavy fault currents. Operate easily under severe icing. Available in vertical or horizontal break or tilting insulator configurations.

I-T-E Circuit Breaker Company U-1
1900 Hamilton St., Philadelphia 30, Pa.

Send me detailed information on the following:

- ☐ Primary unit substations
- ☐ Unit substation transformers
- ☐ K-LINE LV switchgear (600 v)
- ☐ Outdoor air switches
- ☐ Load interrupter switches
- ☐ Outdoor substation structures
- ☐ Reclosers
- ☐ Distribution cutouts
- ☐ Other_____

Name_____ Title_____

Company_____

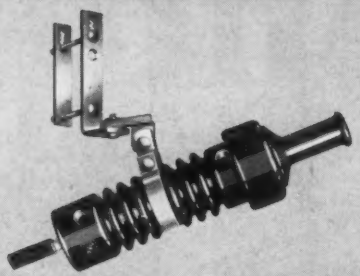
Address_____

City_____ Zone____ State_____

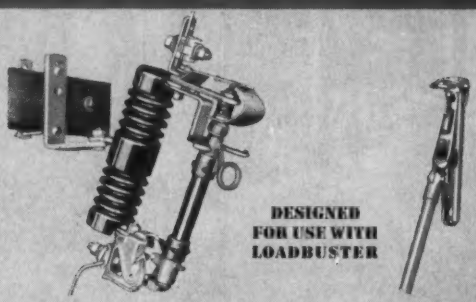
SEND COUPON Get full particulars on specific I-T-E equipment. And remember I-T-E engineering assistance is at your disposal.

For every distribution system

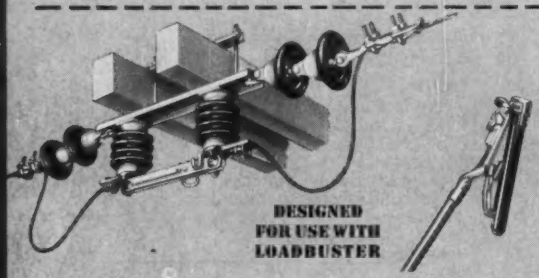
Four devices for low cost load switching at today's higher voltages and loads



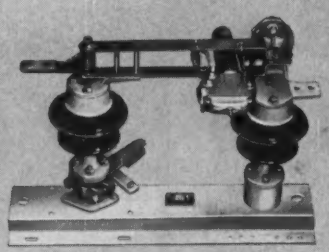
S&C POSITECT—enclosed cutout for full load switching, up to 200 amperes at 5 kv (or as a disconnect—unfused—to 300 amperes). Continuous rating: 50 and 100 amperes as cutout, 100 and 300 as disconnect. Note interrupter attachment at left.



S&C XS CUTOUT—an open cutout designed for use with LOADBUSTER®. Rated 100 amperes continuous as a cutout or 200 amperes continuous with disconnect blade. With LOADBUSTER it will switch full load, and associated charging and magnetizing currents.



S&C LOADBUSTER DISCONNECT—a distribution disconnect, with full published ratings and station-type performance. Rated 15 kv, 400 amperes continuous, 20,000 amperes momentary—95 kv or 110 kv BIL. With LOADBUSTER it can switch all loads, and associated charging and magnetizing currents.



S&C ALDUTI LOAD INTERRUPTER—SIDEBREAK STYLE—three-pole load switching device of long recognized capability. Used primarily for key sectionalizing points. Will interrupt all loads through 600 amperes. Made in 7.2 and 14.4 kv ratings.

S&C ELECTRIC COMPANY

Load switching is a real concern in modern distribution systems, with line voltages of up to 14 kv and load currents as high as 600 amperes. At these voltages and loads, it is impossible or extremely hazardous to open main or branch feeders with ordinary disconnects and cutouts.

Dropping all loads at the source, simply to open a single branch feeder, results in intolerable service interruptions. One alternative—switching with link-break cutouts—is an undependable makeshift. Another alternative—group operated disconnects—still doesn't bring full positive load switching, and is costly.

The S&C solution is a complete "stable" of distribution cutouts, disconnects, and load interrupters—all capable of providing full load switching, at prices to match distribution system economics.

The POSITECT Enclosed Cutout has its own load interrupter attachment. Two other devices—the XS Open Cutout and the Tool Operated Disconnect—are designed to take S&C's portable loadbreak tool, LOADBUSTER®. Finally, the S&C ALDUTI Load Interrupter has a built-in interrupting unit. This reliable interrupter switch has been the standard of the industry for many years.

For additional information on how to give your distribution system universal load switching capability, write to S&C.

S&C Electric Company
4421 Ravenswood Ave.,
Chicago 40, Ill.

In Canada: S&C Electric
Canada, Ltd.
8 Vansco Road,
Toronto 14, Ontario

Disconnects • Cutouts • Fuse Links
• LOADBUSTER • Power Fuses •
Interrupters • Metalclad Switchgear

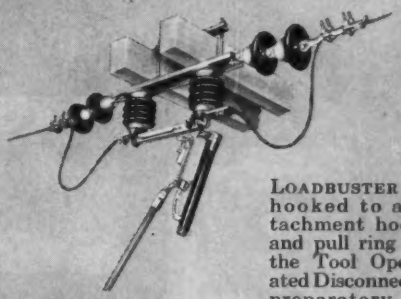
Specialists in High-Voltage Circuit Interruption Since 1910

LOADBUSTER®...

S&C's portable loadbreak tool

This new portable loadbreak tool is used at the end of a universal hook stick for opening disconnects and cutouts designed for use with it. On today's heavy loads, to 400 amperes, and up to 15 kv, this device gives arc-free load switching.

S&C manufactures two distribution devices mated to LOADBUSTER, the Tool Operated Disconnect and the XS Open Cutout. The sequence below illustrates LOADBUSTER opening the S&C Tool Operated Disconnect.



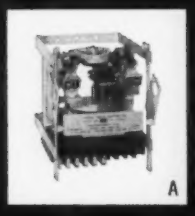
LOADBUSTER is hooked to attachment hook and pull ring of the Tool Operated Disconnect, preparatory to opening.

LOADBUSTER is pulled downward, first opening disconnect blade and providing shunt path across opening; continuing down, the circuit is then interrupted in LOADBUSTER, which latches open.

LOADBUSTER is freed from the attachment hook, then released from the pull ring of the disconnect with a twisting motion. Same procedure is followed for cutouts mated to LOADBUSTER.

Another Engineering Achievement

Reliable Protective Relays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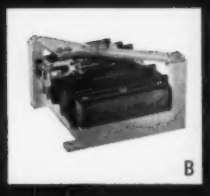
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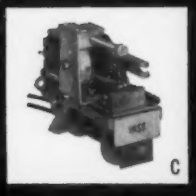
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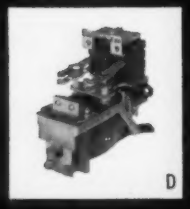
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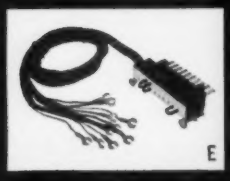

E

...the heart of quality switchgear

This proud new line of protective relays makes Federal Pacific one of only three companies able to furnish all major switchgear components, thus providing for complete quality control and undivided responsibility.

Featuring utmost reliability as well as unusual sensitivity, stability, accuracy, and simplicity, there are only three basic movements—induction disk, induction cup, and hinged armature. Any desired a-c relay characteristic can be provided through variations of the induction disk and induction cup units. What's more, these relays are designed for minimum maintenance and testing time.

A—BASIC INDUCTION DISK UNIT. Used with relays requiring adjustable time characteristics. Note separate connector on bottom which permits removal of the mechanism from the case by merely sliding it forward. No parts need be removed or wires disconnected.

B—BASIC INDUCTION CUP UNIT. This basic unit is used for instantaneous relaying applications where operating times of a cycle or less are required.

C—BASIC HINGED ARMATURE UNIT. Extremely flexible unit for use with a-c or d-c, current or voltage—with hand, self, or electrical reset contacts, circuit opening or closing, or combinations.

D—OPERATION INDICATORS. All induction relays have a combined electrical operation indicator and seal-in contactor of hinged armature design.

E—TEST PLUG. Permits complete secondary tests and checking of all connected circuits. Insertion of the plug instantly transfers relay to test circuit, removal automatically restores relay to service. Alteration of links or connections on the panel is avoided—testing is reduced to a fraction of the time normally required.

Rugged... simple... precise... and reliable. Yes, these new protective relays are worthy of your trust—as is all Federal Pacific electrical distribution and control equipment. Get the best! Write for Relay Bulletin 5-020, Federal Pacific Electric Company, General Offices: Dept. 290, Newark 1, New Jersey.

FPE **FEDERAL PACIFIC ELECTRIC COMPANY**

The Best in Electrical Distribution and Control Equipment

The Electrical Week

FUTURE NEWS ▶ **Look for an attempt to get federal funds** for California's Trinity River project. The House Appropriations Committee may try to "sneak in" a request for such funds.

LATE NEWS ▶ **Florida PUC orders Florida P&L to cut rates $2,864,000 a year . . .** Boston Ed asks Massachusetts Dept of Public Utilities to up rates $4,520,000, of which $2,107,200 is residential.

Two new relays: Allis-Chalmers has a completely transistorized overcurrent relay for ac switchgear applications. GE has static, high-speed, transistorized phase-comparison relays for carrier current uses on transmission systems. Neither unit has moving parts.

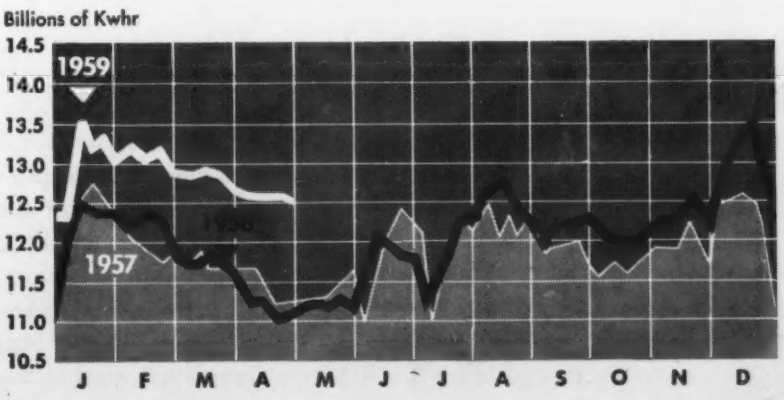
Westinghouse's first-quarter net income for '59 is $14,409,000 vs $12,903,000 for first quarter of 1958. Backlog of orders is "slightly below that of a year ago."

AEC changes "Pathfinder" A-plant contract to include nuclear superheater. Northern States Power is building the plant at Sioux Falls, S. D.

South Carolina extends 3% sales tax to retail electricity sales. Tax is expected to net $1,600,000. It is effective Jan. 1, 1960.

Management changes . . . Delaware P&L elects F. P. Hyer president, succeeding H. H. Plank, who becomes chairman. H. W. Clift is new vp, operations . . . Pennsylvania Electric adds two vps: R. A. Shumaker and M. M. Devorris . . . Puget Sound P&L makes J. H. Clawson senior vp and F. W. Kimball vp-administration . . . A. J. Borchers is new vp at Central Illinois PS . . Ellenville (N.Y.) Electric elects C. D. Raymond, Sr, president, succeeding S. E. Denman, who is named chairman . . . A. W Knight is new president of Western Precipitation Corp, succeeding W A. Schmidt, who remains as chairman.

WEEKLY POWER OUTPUT—UP 11.9% (Week ending April 25), Kwhr 12,538,000,000



Per Cent Change From Previous Year

	April 11	April 18	April 25
Total U. S.....	+11.5	+13.5	+11.9
New Eng.	+ 7.8	+ 9.7	+ 7.3
Mid. Atlantic ..	+ 9.9	+11.7	+10.2
Cent. Ind.	+14.2	+17.1	+15.9
West Cent. ...	+10.8	+11.7	+10.7
Southeast	+ 4.9	+ 8.8	+ 7.5
South Cent. ...	+16.2	+14.3	+12.9
Rocky Mount...	+14.3	+12.9	+14.2
Pacific			
NW	+ 9.5	+11.8	+ 6.8
SW	+23.2	+23.8	+20.2

Seasonally Adjusted Index 252.1

Week Ago 252.0 Year Ago 224.6

Source: Edison Electric Institute

Preview of this Issue

EVENTS ▶ **Oregon delivered another setback for public power** when a bill to establish a State Power Commission failed to get the necessary number of votes in the legislature. This boost for private ownership is latest development in trend away from public power, which Central Surveys has tabulated **(p 48)** . . . Healthy condition of REA co-ops is hailed as "a success story if there ever was one" by David Hamil **(p 48)** . . . Both old and new sources of energy will be explored in a world conference slated for 1961 **(p 52)**.

ENGINEERING ▶ **Kansas City P&L cuts generation costs by building mine-mouth plant** and transmitting load 60 miles to load center. Details of this week's cover story on **page 57** . . . Commonwealth Edison speeds inventory control by (1) machine accounting, and (2) splitting responsibility among several departments **(p 55)** . . . Springfield, Ill., Dept of Water, Light & Power saved $48,000 on three substations by using heavy-duty reclosers and an automatic transfer scheme **(p 62)** . . . Microwave provides Memphis LG&W with reliable communications **(p 54)**.

PROCUREMENT AND PRODUCTS ▶ **Mandatory oil quotas haven't boosted coal prices** to East Coast utilities . . . Hint 1¢ price cut in aluminum billets . . . Southwest utility saves $50,000 a year by charging out miscellaneous hardware items

Politics and Public Power

BROOKS HAYS, MODERATE

Brooks Hays, one of the most popular "lame duck" Congressmen in Washington, is joining the board of the Tennessee Valley Authority.

He is a moderate. Indeed, Brooks Hays was "too moderate" for the emotions of some of the voters of Little Rock, Ark., last November. In the heat of passion over school integration, he was defeated. Hays' appointment to TVA's board of directors to fill out the rest of Frank J. Welch's term was, in part, a vote of confidence from President Eisenhower and Hays' Democratic colleagues.

However, the consequences of his going to the board are even more important. Hays arrives at a time of impending change in the Valley, changes that will affect electric utilities on the perimeter of TVA as well as those inside the TVA complex.

Should the TVA bond-financing legislation become law, Hays will have a crucial vote in making decisions as to how the new authority will be used. He stands as a probable link between the outgoing Eisenhower Administration and the next administration —whether Democrat or Republican. He will stand as a member that either political party can choose to renominate to the board after the 1960 election.

Hays is pro-TVA and pro-REA.

He voted for the Johnsonville plant that set the precedent for TVA to firm up its hydro with steam generation. He also voted for TVA appropriations years ago when Republicans attempted to cut off all money for the Authority.

Yet, he supported the Dixon-Yates contract, contending that private development on the Arkansas side of the Mississippi River was good for TVA, Memphis and Arkansas.

by the package rather than individually . . . First aluminum prototype towers pass structural tests **(p 74).**

Manufacturers News . . . GE expects acrylic paint to cut maintenance costs for outdoor power equipment . . . Four Updegraff 10-Mva transformers shipped to City of Detroit assembled and ready for use . . . Moloney Electric builds 217-Mva transformer for PEPCO **(p 76).**

New Equipment . . . Plug-in connectors are self aligning, yet give positive seal of terminal arrangement . . . Lightning arrestors have low-discharge characteristics, low-impulse sparkover, and high-surge capacity . . . Bullwheel tensioner supported by pole in the line **(p 82).**

MANAGEMENT ▶ **Utilities can save from 5 to 10% on cost of boilers,** says Combustion Engineering, Inc, if they order early, accept early delivery, and store components on the site. Savings on escalation outweigh increased costs of interest and storage, according to CE. This "buy and store" plan may have other utility applications **(p 93).**

SELLING ▶ **Hartford Electric Light adds 8,000 kwhr to residential use** when it helps modernize enclosed porch with heat pump and lighting **(p 92).**

He voted for private development of the Niagara project, and has been less than generous in voting for funds for Bonneville and Southeastern Power Administrations.

And he has the wholehearted support of two senators who are not in the "crusading for Tennessee Valley Authority" camp—Arkansas' John McClellan and W. J. Fulbright.

REA HARDLY SACROSANCT

The Washington Post-Times Herald is a highly respected newspaper whose editorial position most Washingtonians regard as "liberal," that is, its editorials are aimed at the social and welfare legislation of the New and Fair Deals. Not so with the issue of making the REA autonomous. Here are some excerpts from an editorial which appeared the weekend before the President vetoed the REA Reorganization (Humphrey-Price) Bill:

"The primary purpose of the proposal seems to be to embarrass Secy Benson, rather than to improve the rural electrification program . . . (The bill was vetoed) after much high-voltage prodding from the REA cooperatives, many of which seem to be as interested in crossing Mr Benson's wires as they do in building more power lines . . .

"The rather vague and generalized charges by the REA co-ops that Mr. Benson has sought to sabotage the loan program cannot be substantiated. There is no record of his vetoing a single loan approved by the REA Administrator."

This is the second time the Post has editorialized on REA. During the NRECA annual meeting it came out in favor of reversing the 2% interest rate to bring it in line with the cost of money to government.

Executive Reader

An excellent technical engineer is not necessarily a potential engineer-administrator. To move successfully from engineer to manager, the candidate should have, or be able to acquire, a knowledge of management and techniques; must measure up to the personal qualifications; and be skilled in applying the scientific approach to many problems. **Oliver J. Sizelove, Newark (N. J.) College of Engineering, Mechanical Engineering, April, 1959.**

Wages can be kept in line by (1) knowing the real wage costs; (2) eliminating hidden costs in the labor contract; (3) re-evaluating the incentive program; and (4) improving company climate so that managers are leaders, not pushers. **Steel, April 13, 1959.**

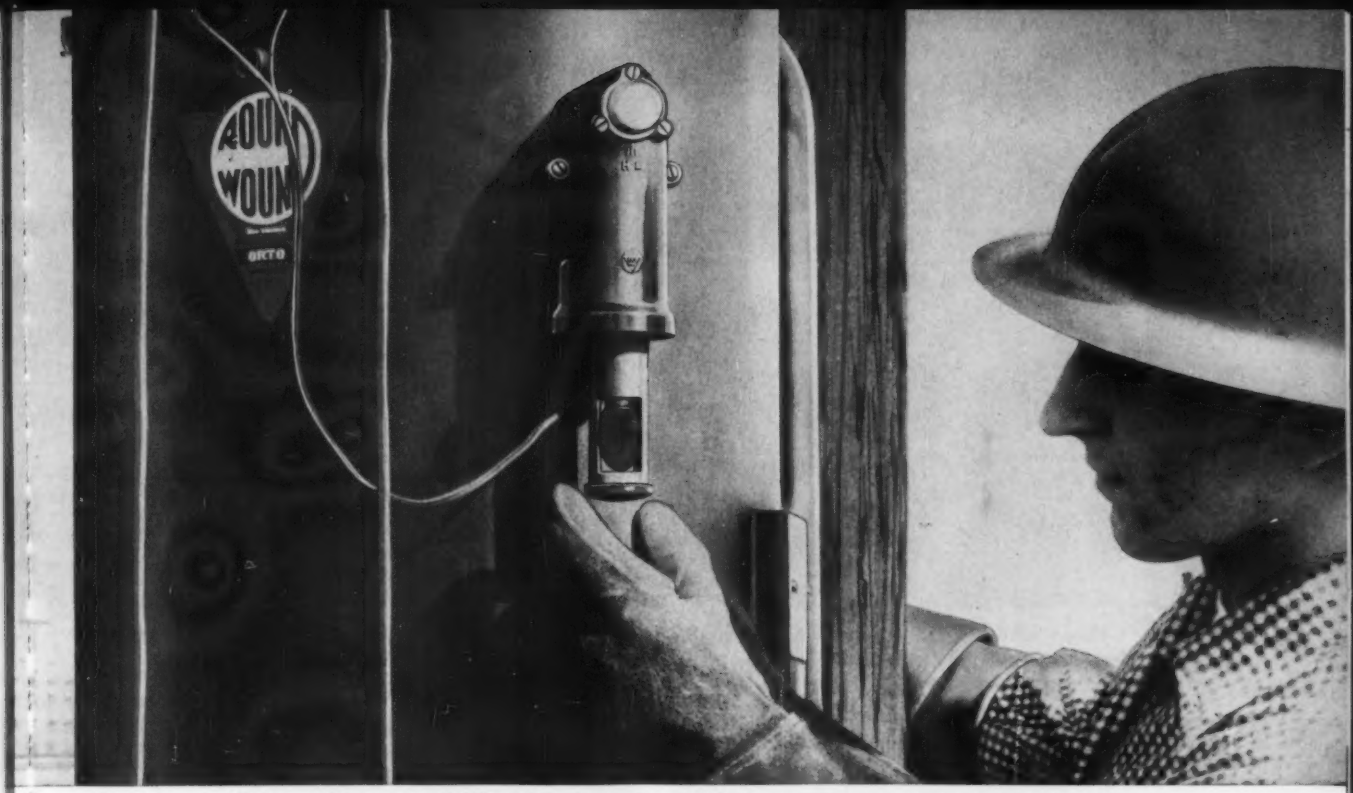
Check list for local publicity suggests five classes of activity about which news releases may be written regarding the personal, civic, management, or industry events of utility people. **Paul Lockwood, Rural Electrification, April, 1959.**

TECHNICAL NOTES

Uranium monocarbide and fueled graphite will emerge as the greatest fuel developments of the coming five years. Columbium-base uranium alloys will be standard high-temperature fuel for special applications. Intensive efforts will be made to realize the potential of plutonium as a nuclear fuel. **R. F. Dickerson, Battelle Technical Review, April, 1959.**

Noise sources in power plants that may need corrective action are gas breeching duct, forced draft fans, boiler feed pumps, transformers and main units. Masonry or metal enclosures, acoustical baffles, silencers, or acoustical lining of enclosure surfaces are possible solutions. **W. W. Aubele, Florida Power & Light Co, E&O Section, SEE, Belleair, Fla., April, 1959.**

Operation of distribution fuse links should be understood before the most suitable type can be selected for a particular system. How fuse link design and characteristics affect operation of the device is developed through answers to questions posed by a utility engineer. **A. B. Levering, General Electric Co, Distribution, April, 1959.**



WHEN PROLONGED OVERLOAD overheats the transformer windings, top oil temperature rises; tank wall gets hotter; and the L-M Thermal Overload Indicator drops its red signal light or luminous yellow tube to indicate the overload. No interruption of service; no costly periodic load checks. Fits any make of conventional transformer up to 100 kva.

Utilize Full Transformer Overload Capacity With L-M Thermal Overload Indicator

Cuts costs of load checks; helps maintain continuity. Alnico magnetic mounting bracket makes installation easy on *all* makes of conventional transformers. Choice of red signal light or luminous yellow tube signal.

Utility companies have been buying L-M's Type D Thermal Overload Indicator in large quantities for a number of reasons. The unit is simple; it is easy to install; and the cost is less than a $10 bill.

The indicator eliminates costly periodic load checks, by providing a *continuous* load check instead. It helps prevent transformer burnouts by giving ample warning. In addition, it avoids service interruptions because it doesn't cut off the transformer load; it simply *indicates* the existence of an overload.

L-M's indicator, compensated for ambient temperatures, measures tank-wall temperature, which in turn reflects top oil and hot-spot temperatures. It indicates a prolonged overload with a red light that drops down and turns on, or with a drop-down luminous yellow tube.

The small cost provides a most favorable return in both savings and service continuity. Ask the L-M Field Engineer for Bulletin 57105 or a sample. Or write Line Material Industries, Milwaukee 1, Wisconsin.

ALNICO PERMANENT MAGNET holds the L-M overload indicator firmly to the tank wall.

LINE MATERIAL® Industries

McGRAW-EDISON COMPANY

McGRAW EDISON

Protective Equipment

381

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT

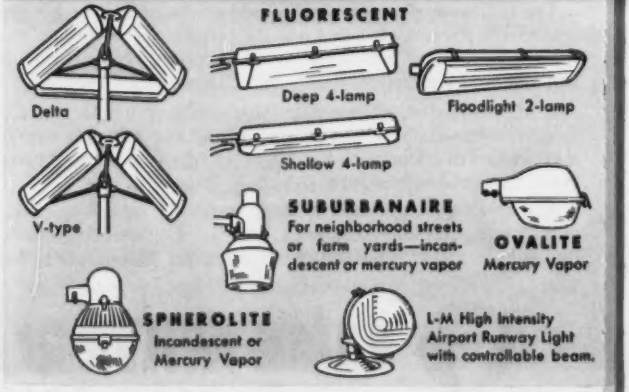
LINE MATERIAL FLUORESCENTS provide the lighting needed to attract customers to this shopping center, and to illuminate the parking area in front of it. The installation consists of deep four-lamp units, which provide ample light for display and security.

MOTEL OWNERS recognize the value of controlled lighting that lights up the approaches and driveways without disturbing glare. This owner selected L-M Ovalite luminaires, which utilize 21,000-lumen mercury vapor lamps to provide high-level illumination.

L-M FLOODLIGHT FLUORESCENTS provide excellent light for night operations on this loading dock, since the low brightness of the units will not blind the workers. Each unit contains two 6-foot fluorescent lamps with a total output per luminaire of 11,400 lumens.

INCANDESCENT-BURNING SUBURBANAIRE LUMINAIRES mounted on brackets from the building light the store front and parking area of this National Food Store. The warm light of the incandescents provides natural color for food items in the windows.

SOME TYPICAL L-M LUMINAIRES



LINE MATERIAL®
McGRAW-EDISON COMPANY

SPECIALLY DESIGNED LUMINAIRES in Rhondda Valley Shopping Center, Sunnyvale, Calif. This installation and the special units were designed under the direction of L-M Lighting Engineer Bruce Kunde, in cooperation with the designer, Robert M. Sherman, and Cupertino Electric Company, the electrical contractor. The two units on each standard are L-M floodlight fluorescents, holding two 6-foot lamps.

Streets, Shopping Centers, Airports . . . You Name It . . . L-M Will Light It!

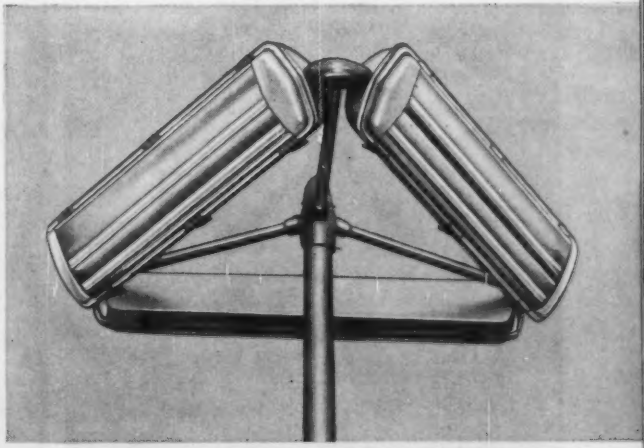
Line Material, a pioneer and leader in outdoor lighting, provides incandescent, mercury vapor, fluorescent luminaires and related equipment for a wide variety of applications. Standard and special designs are available. L-M Lighting Application Engineers cooperate with utilities, municipalities, engineers, architects and contractors to help provide the most suitable, efficient, and economical equipment for each particular application.

The specially designed lighting unit in the Sunnyvale, Calif., shopping center shown above is an example of an unusual problem solved by one of L-M's Lighting Engineers, with the cooperation of L-M's engineering and manufacturing departments. The delta unit, shown at right, is also designed especially for area lighting.

Other fluorescent units include the V-type, which gives excellent street lighting; the 2-lamp floodlight, used for wall mounting on airport runways, loading docks, store fronts, etc. A wide variety of mercury vapor and incandescent units are used for highway intersection, toll road, access, neighborhood, and rural lighting.

Bring Us Your Lighting Problem

Whatever your outdoor lighting job may be, talk to the L-M Field Engineer or Lighting Engineer. You'll get suggestions, information, bulletins, and, if you wish, a complete lighting application engineering job. Or, if you prefer, write Lighting Division, Line Material Industries, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.



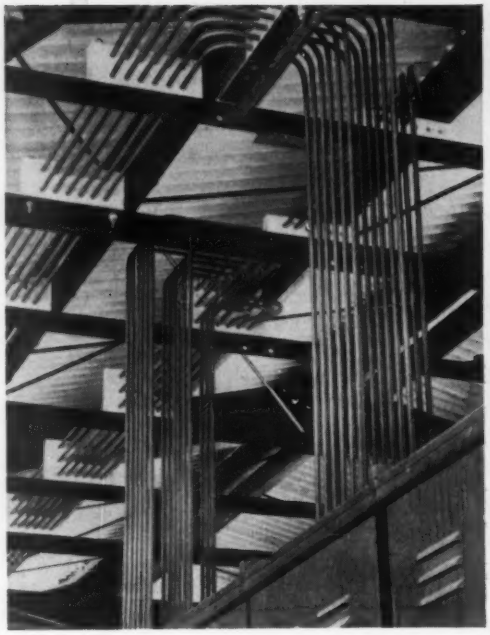
L-M's DELTA TYPE, especially suitable for area lighting, such as parking lots, shopping centers, etc. The unit consists of three 2-lamp floodlight fluorescent luminaires—with six 6-foot fluorescent lamps providing a total output of 34,200 or 55,800 lumens, depending on lamps used. Design of the reflectors assures high utilization of light output with a minimum of glare.

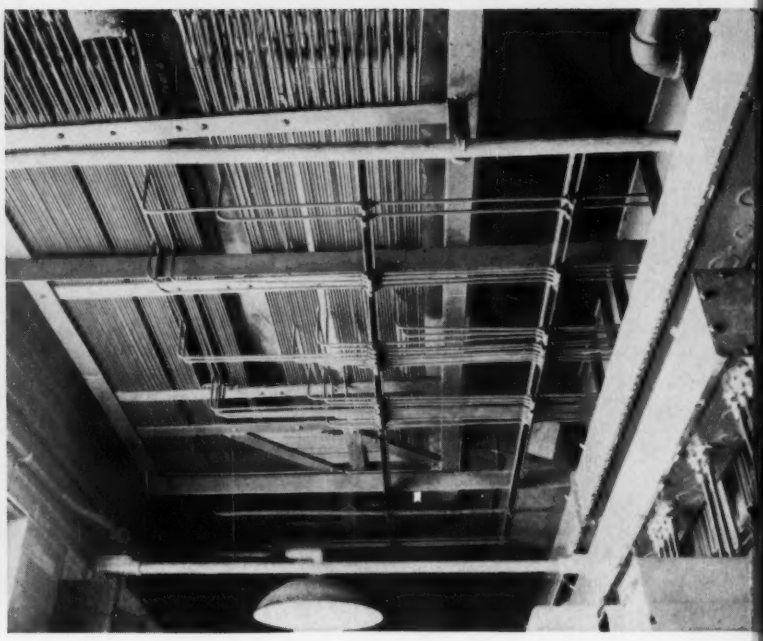
Industries Outdoor Lighting

McGRAW EDISON

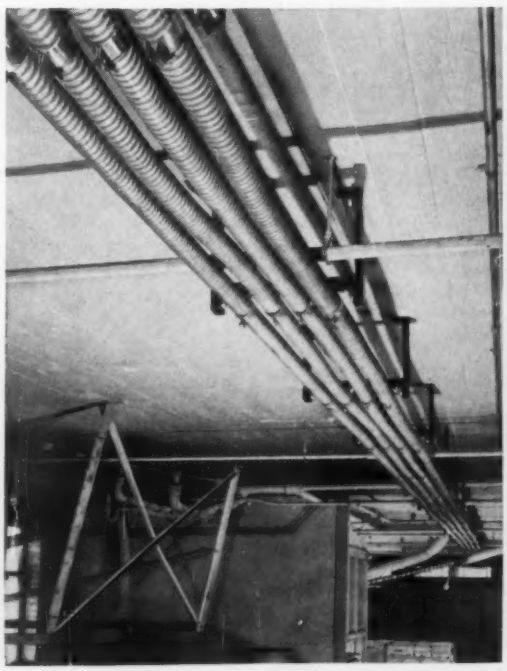
379

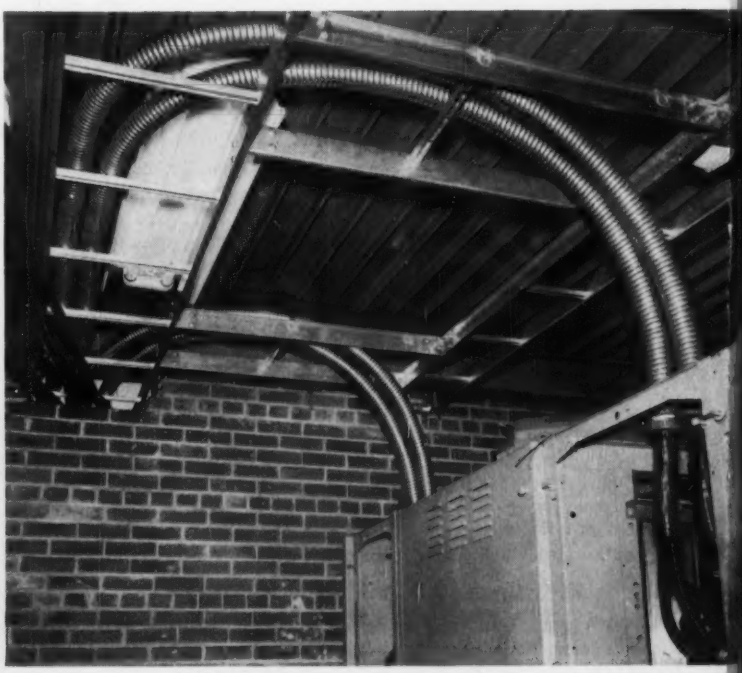
DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT



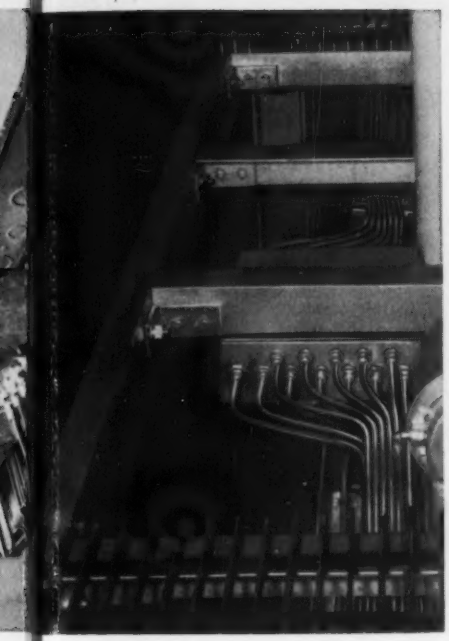


the right combination for





ONLY GENERAL CABLE MANUFACTURES BOTH TYPE MI AND INTERLOCKING ARMORED CABLES. CONTACT YOUR NEAREST GENERAL CABLE SALES OFFICE FOR FULL INFORMATION AND SPECIFICATIONS.



type mi cable

for power distribution, control and lighting circuits

TYPE MI CABLE has solid copper conductors and sheath separated by highly compressed inorganic insulation! Just about indestructible, yet it trains easily over and around obstructions. Naturally it needs no protection: just train it and terminate it. MI is compatible with all other wiring systems. It is completely resistant to moisture, age, nearly all chemicals, temperatures up to 185°F with standard terminations, 482°F with special terminations; and it is approved for use in hazardous areas. It will last forever.

industrial power

Type MI Cable and Interlocking Armored Cable work together to lower installation costs, minimize space requirements, provide maximum flexibility and accessibility in your cable systems.

inter-locking armored cable

for feeder circuits

GENERAL CABLE'S Interlocking Armored Cable combines flexibility with the mechanical protection normally afforded by metallic conduit, yet has the same current rating as cable in free air. It can be trained to fit the contours of buildings and surrounding equipment and provides a neat, compact installation. It is available in bronze, aluminum and steel and may be applied over most cable insulations in the voltage ranges recommended by industry standards. Protective coverings are available to combat environmental conditions which might cause pitting or corrosion of the interlocking armor.

GENERAL CABLE CORPORATION
65 Offices and Distributing Centers Coast-to-Coast

420 Lexington Avenue,
New York 17, N.Y.

for quality and service specify... **GENERAL CABLE**

PENNSYLVANIA TRANSFORMER introduces .....

1st ■ ■ ■ LTC transformer to permit safe inspection and maintenance of LTC switch contacts and complete drive mechanism while transformer remains energized and supplies uninterrupted three-phase power to its load.

1st ■ ■ ■ three-phase LTC transformer to provide *SINGLE PHASE* regulation controlled individually from separate independent control circuits.

In announcing the new Phase-Isolated LTC Transformer, the sales and design engineers believe they are offering the ultimate in three-phase transformers. For the first time, here is a transformer that offers you *ALL* of the advantages and flexibilities of single-phase regulation. The cost is only slightly higher than that of a conventional three-phase LTC transformer; however, this extra cost is more than erased by the economies derived in the following two ways:

(1) Purchasing and handling a single piece of equipment.

(2) Installing and placing into service one Phase-Isolated LTC three-phase transformer rather than three separate regulators, bypass switches and a transformer or a transformer bank.

THREE INDEPENDENT CONTROL CIRCUITS

Each phase of Pennsylvania's three-phase LTC transformer has an independent control circuit and LTC mechanism. This enables it to regulate the outgoing voltage of each phase in accordance with the individual load demands of each phase. The separate control circuit for each phase allows the accurate selection of "R" and "X" compensation settings for each phase. Similarly, each phase has its own independent voltage regulating relay, voltage level adjustment, band width adjustment, operation selector switch, operation counter, integrating time delay assembly, and potential test terminals.

COMPLETELY SELF-CONTAINED

All Pennsylvania Phase-Isolated LTC Transformers are completely self-contained. Each phase has a separate internally mounted current transformer for its independent line drop compensator and a separate internally mounted potential supply for its independent voltage regulating relay and LTC mechanism drive motor.

BYPASS SWITCH

Each phase of Pennsylvania's Phase-Isolated LTC Transformers has a manually operated, integrally mounted, oil-immersed combination LTC bypass, disconnecting, and grounding switch that permits safe inspection and maintenance of LTC switch contacts and complete drive mechanism while the transformer remains energized supplying uninterrupted three-phase power. The bypass switch for each phase is key interlocked to prevent operation except when the LTC mechanism for that phase is in its neutral position. Terminals are provided for the convenient attachment of visible grounds to both ends of the series winding and both ends of the preventive auto winding when the LTC compartment is open.

For further information write on your company letterhead for free copy of descriptive booklet No. 591. Address Sales Dept. Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pa.

Pennsylvania Phase-Isolated Three-Phase Transformers are available in the following kva and voltage ratings:

BIL	LOW VOLTAGE	KVA
75 Kv	4160Y/2400 or 4360Y/2520 volts	1000 Kva thru 2500/3125 Kva incl.
95 Kv	8320Y/4800 or 8720Y/5040 volts	1000 Kva thru 5000/6250 Kva incl.
110 Kv	12470Y/7200 or 13090Y/7560 or 13200Y/7620 or 13800Y/7900 volts	1000 Kva thru 7500/9375 Kva incl.

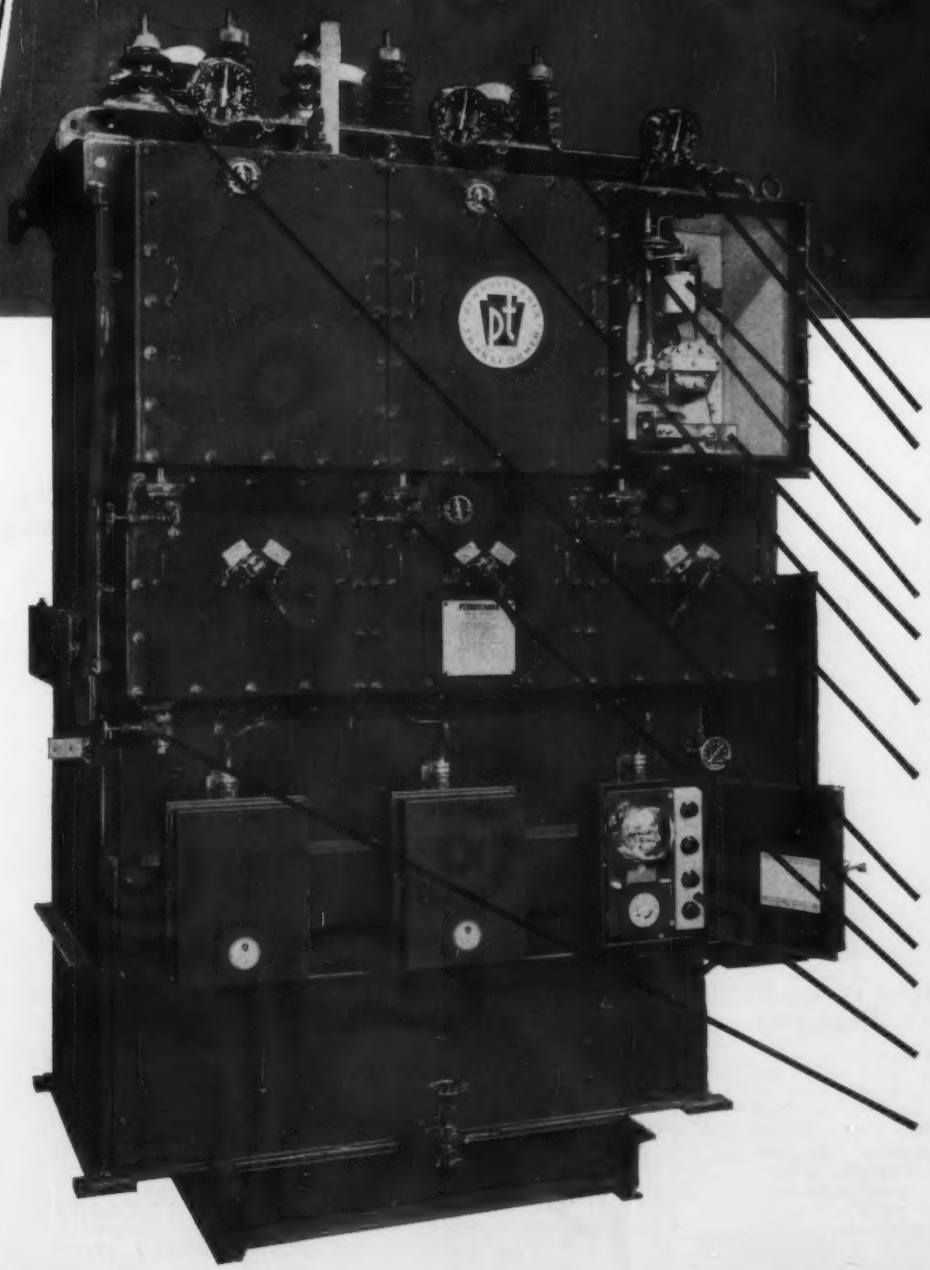
PENNSYLVANIA TRANSFORMER DIVISION
McGRAW-EDISON COMPANY
CANONSBURG, PA. *Greater Pittsburgh District*

McGRAW EDISON

PENNSYLVANIA

the NEW Phase-Isolated LTC TRANSFORMER

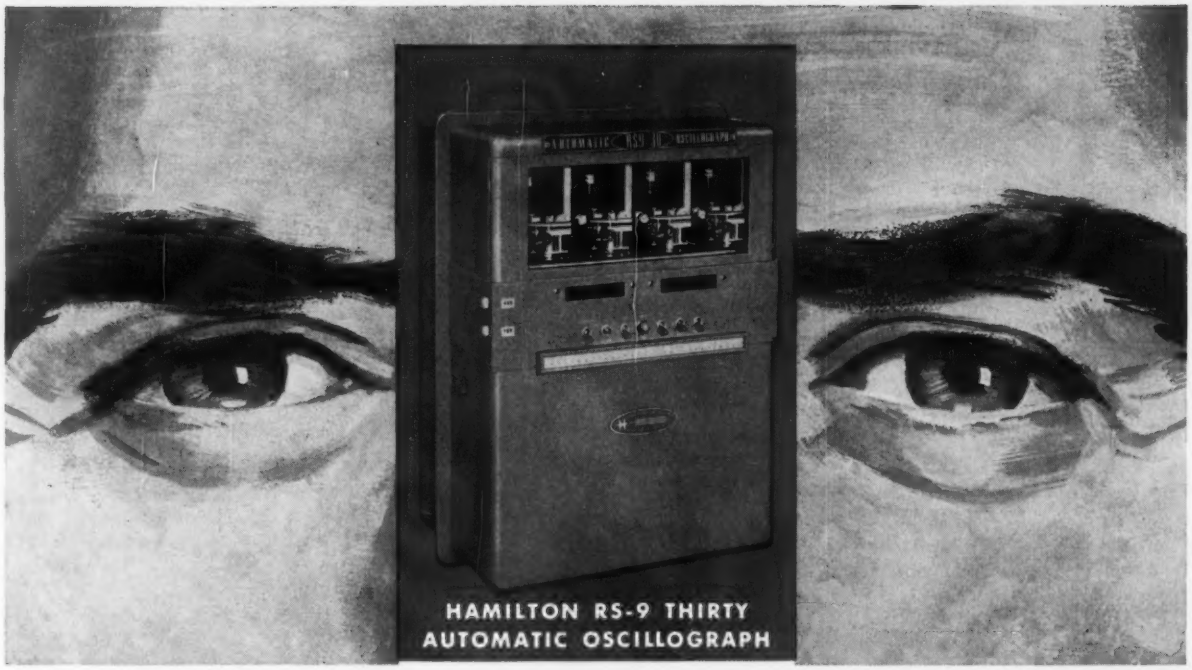
(Patent Applied For)



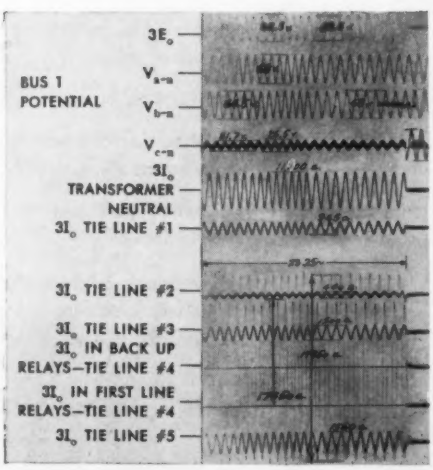
- Key interlock.
- Position indicator with adjustable limit switches.
- Individual LTC mechanism and drive motor.
- High voltage bushings.
- Provisions for conveniently applying visible grounds.
- Magnetic type liquid level indicator.
- Key interlocked, manually operated, combination LTC bypass, disconnecting and grounding switch.
- Low voltage bushings.
- Pressure vacuum gauge.
- Individual LTC compartment drain valves.
- Weatherproof control cabinet.
- Bypass switch compartment drain valve.

POWER TRANSFORMERS

PENNSYLVANIA TRANSFORMER



THE HAMILTON CONSTANTLY STANDS WATCH OVER YOUR PROTECTIVE SYSTEM



HERE IS PROOF THAT IT WAS A BREAKER THAT FAILED!

This is an oscillogram of an actual fault on a solidly grounded system phase-to-ground, approximately 0.4 mile from the bus. The line circuit breaker failed to clear the fault. The oscillogram shows that both first line and back up relays had the same value of current in each, which is correct. The oscillogram shows some change in the $3E_o$ and the E_{c-n} trace as well as changes in amplitude of the $3I_o$ current at 9 cycles. This indicates that the breaker attempted to clear the fault in about normal time and failed. It also tells that this is a breaker failure not a relay or trip circuit failure. It shows that the back up relaying had the expected value of current in it and cleared the fault correctly after a time delay.

...The Hamilton RS-9 Automatic Oscillograph provides proof of sequence of relay and breaker operation—a permanent record of what happens when a fault occurs.

The Hamilton RS-9 Automatic Oscillograph constantly stands by monitoring your system. It gives you a comprehensive record of the operation of your protective system under fault conditions, providing the proof you need of the sequence of relay and breaker operation. Often, faulty equipment is shown up before it can cause damage or down-time.

Within 2 milliseconds after a fault occurs, the Hamilton is automatically at work, recording the transient wave forms for analysis. The record produced has a sharp trace that is easy to read—easy to analyze.

There are two models of the Hamilton RS-9 Automatic Oscillograph—the RS-9 Fourteen with 14 recording elements and the RS-9 Thirty with 32 recording elements. *Both were designed specifically for use in power plants.*

For complete information about the Hamilton RS-9, write to: Hamilton Watch Company, Hathaway Instrument Division, Denver, Colorado.

HAMILTON WATCH COMPANY
HATHAWAY INSTRUMENT DIVISION
5800 East Jewel • Denver, Colorado

6 Ljungstroms® go to work for the city of Memphis ...and so does lifetime Air Preheater service

The City of Memphis Light, Gas and Water Division has just installed three boilers served by six Ljungstrom preheaters. Why Ljungstrom preheaters? One reason is service. Air Preheater engineers don't just wait for a call. They regularly inspect and help maintain Ljungstroms *through the life of each unit.*

What's more, Air Preheater provides rapid *factory* service in an emergency. Here's an example. A customer phoned on a Friday morning for a replacement trunnion—a major integral part of the preheaters. His Ljungstrom was 17 years old, which meant that a new trunnion had to be custom made to match his older-style. He was located 500 miles away. And he needed his boiler back on the line by Sunday.

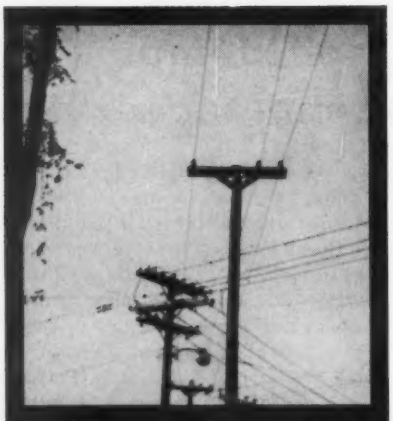
Air Preheater went to work. Special trucking was arranged. The job was done *and shipped* that same evening. The customer had the trunnion by Saturday morning and the boiler was back on the line by Saturday evening!

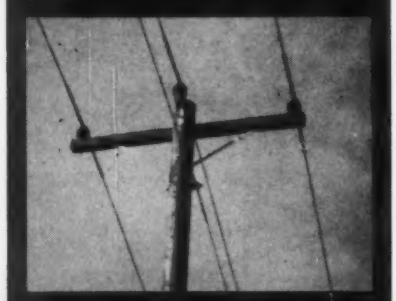
Fast response to emergencies and regular inspection of Ljungstrom installations are two of the many advantages Air Preheater provides its customers. Another is expert knowledge of boiler and preheater problems —and how to lick them—gained from over 35 years of experience. Perhaps these reasons explain why 9 out of 10 preheaters sold today are Ljungstroms. For further information write today for free illustrated brochure.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

Ljungstrom rotor being installed for the City of Memphis Light, Gas and Water Division. Six such Ljungstroms—each with 201,400 sq ft of heating surface —will serve three boilers. The boilers will each evaporate 2,000,000 lbs of steam/hr and have a combined nameplate capacity of 750,000 kw. A fourth boiler unit is now under consideration. Burns and Roe, Inc. designed and supervised construction.





LAPP DISTRIBUTION POSTS

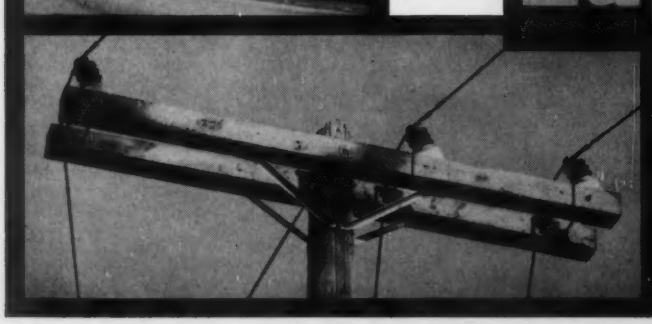
Line Post reliability for distribution lines up to 27 kv

No distribution line you can build will serve as dependably, save as much sleep for your maintenance crews, or build as much customer good-will, as the one you put on Lapp Distribution Posts. These trim-appearing "junior Line Posts" just won't puncture . . . their solid one-piece porcelain body separates conductor from ground for its full length. Won't crack either . . . the only metal-to-porcelain joint is at the base; loading of porcelain is only in large-area, low-intensity compression. Greatly more resistance to flashover and impact, too . . . has short super-sturdy petticoats, with extra protection against failure in the fact that when petticoats are broken away, the post body remains intact with almost its full insulating values. Completely free of radio- or TV-interference at any operating voltage. Fog-type for superior performance in dust or atmospheric contamination.

Where else can you get so much for so little cost? Better look into it.

Lapp Insulator Co., Inc., Le Roy, New York.

Lapp



PROTECT YOUR EXPENSIVE OVERHEAD EQUIPMENT WITH

WEAVER GROUNDS

Leading Electric Utilities Specify WEAVER Equipment for Long-lasting, Trouble-free Grounding

GROUND RODS

Heavy, uniform copper coating, molecularly bonded to a rigid steel core, assures permanent grounding. The copper is work-hardened and resists scarring in rocky soil. A special draw gives the core more rigidity and with machined point driving is easier . . . chamfered top eliminates mushrooming and splitting.

GROUND ROD CLAMPS

Cast of high-strength, silicon aluminum bronze, yet cost no more than extruded types of clamps. Design guarantees perfect alignment between ground wire and rod. Big half-inch screw with rounded point gives high pressure contact without damaging the copper on the rod . . . machine-cut threads withstand high torque without stripping or breaking. Available with socket or square heads.

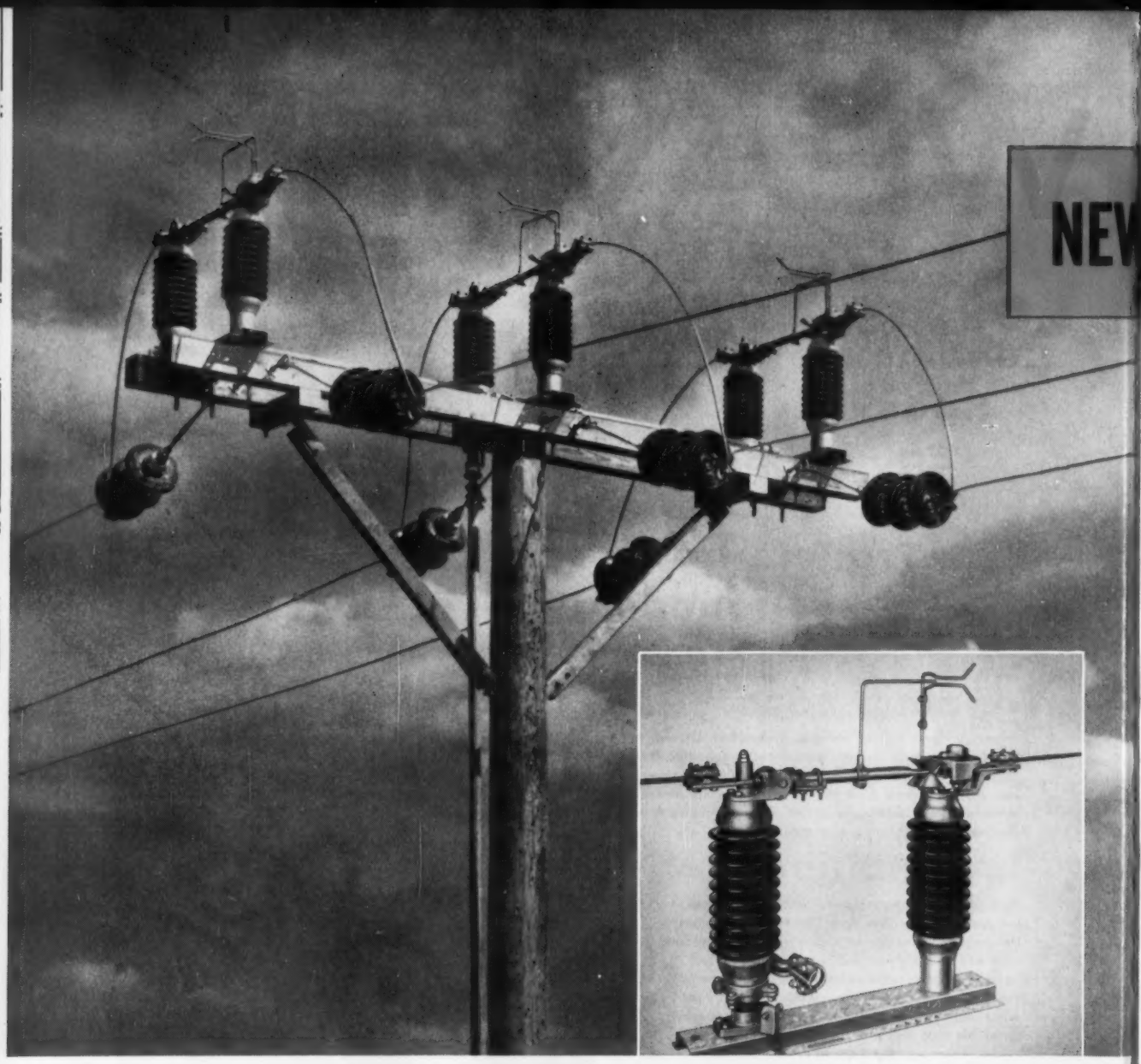
POLE BOTTOM GROUND PLATES

Weaver Plates with 25% more copper area than other types of plates, provide better overload dispersal . . . yet cost no more. It is the only plate with a heavy duty cast bronze connector to give high pressure contact between plate and ground wire . . . assures long-lasting, safe grounding.

J. A. WEAVER Company

Ask Your Electrical Wholesaler for WEAVER Grounding Equipment

3110 Howard Street • St. Louis 6, Mo. • CEntral 1-8100



NO OTHER SIDE-BREAK DISCONNECT GIVES YOU ALL OF THESE OPERATING ADVANTAGES

- **Correct contact always maintained at blade tip even if crossarm warpage distorts the switch base.**
- **All blades engage fully in the break-contact jaws without precise adjustment of the inter-phase rods.**
- **Less time and labor to install with Kearney original wide-tolerance mechanical design.**
- **Easiest, surest ice-breaking ability available on both opening and closing.**

This newest Kearney development solves long-existing operating problems of crossarm mounted group operated side-break disconnects. The best supporting structure or crossarm construction may . . . due to ice loads, age, wind or line strain . . . deflect enough to distort the switch bases, or alter the relative positions of the three phases. This often causes loss of contact or failure of all blades to close completely in conventional disconnects with both rigid blades and stationary break-contacts.

Kearney's advanced design features a self-aligning blade constructed to permit controlled vertical movement and axial rotation. This automatically compensates for base distortion . . . keeps the blade tip correctly aligned in the contacts. The break-contact swings 30-degrees with the blade as it is opened or closed, producing high leverage ice-breaking ability and full wiping of the silver current transfer surfaces. On closing, the blade tip fully engages the break-contact before the contact moves from its angular open position, compensating for any shift in position of the switch bases. This same feature also allows considerable freedom in interphase rod adjustment, enabling Kearney *Self-Aligning* side-break switches to be installed faster and more economically than other types.

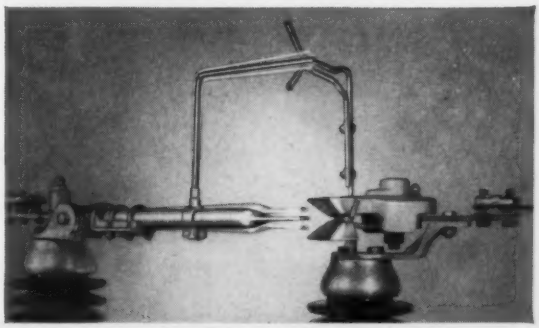
The details of these original features for maintenance-and-adjustment-free operation are shown on the facing page.

Kearney's

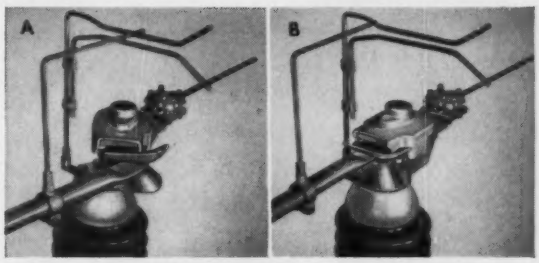
NEW *Self-Aligning* SIDE-BREAK DISCONNECTS

...always make positive contact, even if the supporting structure warps, twists, bows or settles.

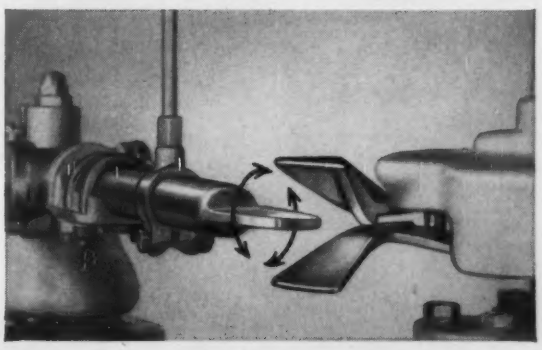
Self-aligning blade moves in a vertical plane to re-establish the original relationship between blade tip and contacts if supporting structure warpage distorts switch base. Wide mouth contact jaws assure blade entry into the contacts. Vertical 1¼" movement more than corrects for extreme cases of misalignment.



Break-contact swings 30° in the plane of blade travel as switch is opened or closed, providing highest leverage ice-breaking and full wiping of the current transfer surfaces. Note that the blade tip is fully engaged, and full contact is maintained (A) through the final 20° of blade travel to the fully closed position shown at (B). This feature allows more latitude in phase rod adjustment than other designs.



Blade rotates 12° on its longitudinal axis. If base distortion has affected blade-contact alignment, the blade tip will rotate as it enters the break-contact to keep all contact surfaces parallel, automatically restoring contact alignment. Friction reducing construction at all rotation points minimizes operating effort.



Switch carries full-rated load current well within NEMA temperature rise, from a fully closed position to 20° partially open position. Ratings available, 7.5 through 69 kv, 600 amperes. Equipped with conventional or whip-type arcing horns... torsional or spade-type operating mechanism. May be mounted horizontally, vertically, or underhung.

For full details talk to your Kearney representative, or write direct for Bulletin 8B.

JAMES R. KEARNEY CORPORATION

4224-42 Clayton Avenue, St. Louis 10, Missouri

397

FOR BETTER CONSTRUCTION . . . SAFER MAINTENANCE

Specify Kearney Products

Plants at: ST. LOUIS • FAYETTEVILLE, ARKANSAS • SHENANDOAH & CLARINDA, IOWA • GUELPH, ONTARIO, CANADA

PUSH BUTTON PEAKING -

G —ANYWHERE, ANYTIME

Completely unattended, 6000 KW Electro-Motive Plant is on the line at full power in ninety seconds or less

A signal from a central dispatching point brings Electro-Motive Peaking Power on the line where it's needed—near the load. Within 90 seconds from the push of a button, you can satisfy peaking or spinning reserve requirements. It starts, synchronizes, goes on the line, and steps up to full power output *completely unattended*. No warm up period is needed, no prior preparation is required.

The Electro-Motive Peaking Plant is an *outdoor*, sound-deadened, weather-proofed plant ready for easy installation anywhere on the system—right at the step-down substation serving the load. No expensive building or foundation work is required.

Unitized, self-contained design allows:

- **low investment cost..$85 per KW, f.o.b. factory**
- **low installation costs..less than $15 per KW**
- **flexibility in meeting site limitations**
- **adjustment in capacity at very low incremental cost**

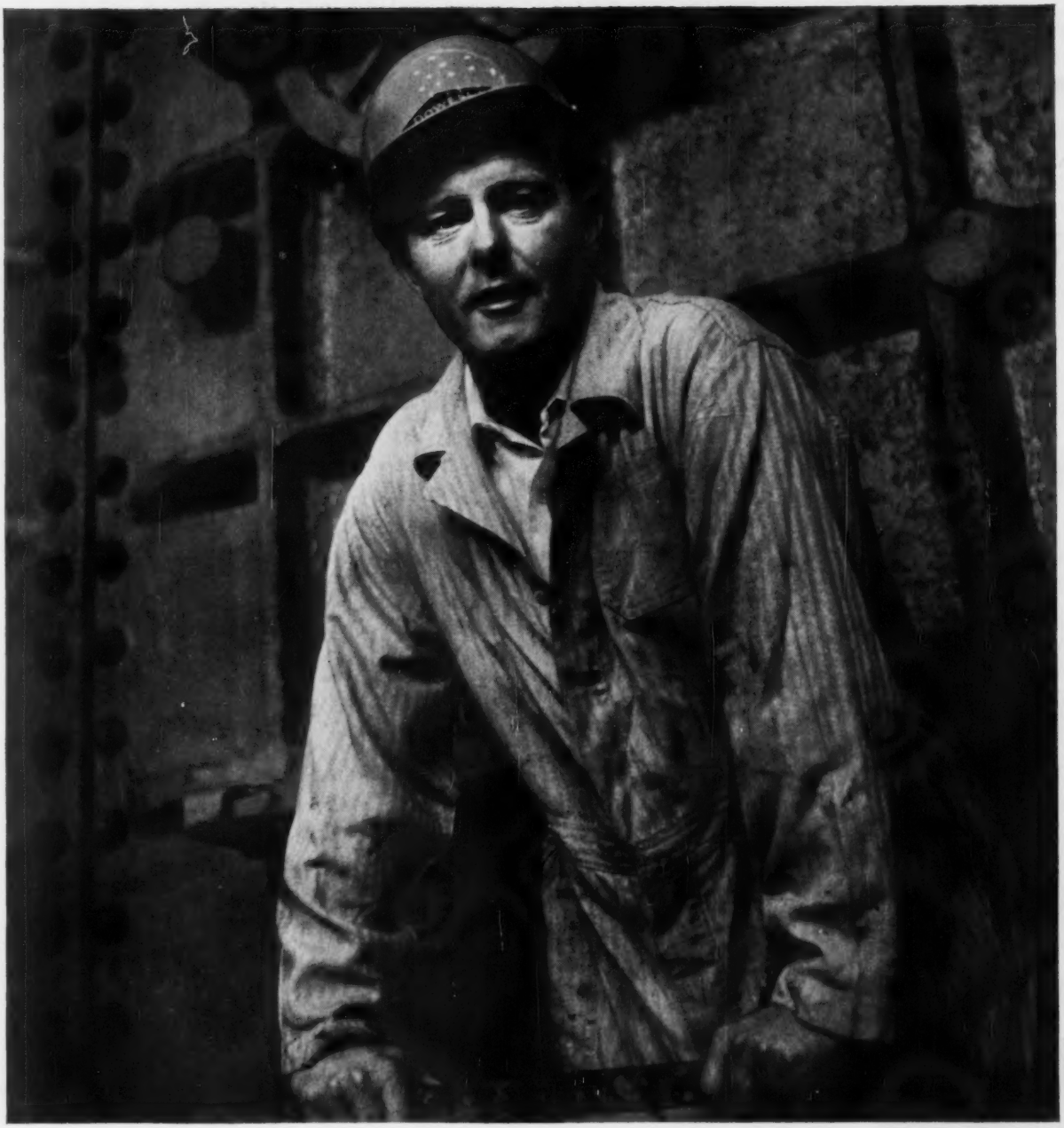
An Electro-Motive 6000 KW Peaking Plant can be operating on your system in less than 5 months time—4 months lead time plus 10 days for installation.

For complete details, see your Electro-Motive representative.

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS • LA GRANGE, ILLINOIS

Sales-engineering offices: Chicago, New York, St. Louis, San Francisco

In Canada: General Motors Diesel Limited, London, Ontario



This Man Can Mean Extra Profit For You

This is a Dowell Service Engineer. He is an expert in the use of chemical solvents to remove scale and sludge from your process systems, boilers, tanks and piping.

Using the exclusive Dowell methods of chemical cleaning, this engineer can free up the profits that these deposits cut from your operating ledger.

More than 15 years experience in all industries—for example, oil refining, chemical, steel, public utilities and paper—give Dowell engineers full knowledge of the problems of cleaning plant equipment.

Add to this experience the benefits you get in special equipment, chemicals, research and trained people.

Put this ability and experience to work for you. Let the Dowell man engineer a profitable chemical cleaning program for you. Dowell—the largest, the oldest, the most experienced chemical cleaning service—Tulsa 1, Oklahoma; and 165 stations and offices in major industrial centers.

Chemical cleaning service for all industry

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

SEE AND HEAR
the dramatic story of
SINGLE-VENT SMALL-BORE CUTOUT OPERATION

See the new 16mm sound and color movie "The Hubbard EHD Faultmaster" right from your own desk chair. Film time: ten minutes.

Watch the Hubbard EHD Cutout clear faults throughout the range without "null operating points"—see closure on a fault, dramatizing conclusively the *positive protection* and *safe operation* provided by the Single-Vent Small-Bore fuse cutout.

Through the use of ultra slow-motion photography, you see the fuse link melt right before your eyes...you see gases generated within the fuse tube and discharged downward and away in a single confined cone—eliminating the possibility of damage to overhead construction. You see the results of research leading to the industry's first Single-Vent Small-Bore Cutout in the extra heavy duty range.

Write the Advertising Department, Hubbard and Company for information.

No screen is needed, no threading, no rewind, no darkened room. Just plug it in and watch. Filmed at the Hubbard Electrical Research and Development Laboratory.

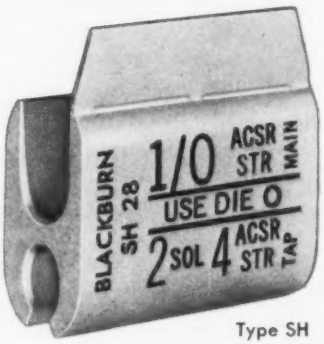
HUBBARD

AND COMPANY • 200 SOUTH MICHIGAN AVENUE • CHICAGO 4, ILLINOIS

ENGINEERED INTO
BLACKBURN'S
COMPRESSION CONNECTORS

High Conductivity-

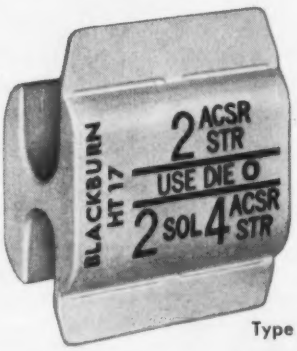
Blackburn has engineered all compression connectors shown to fit your present tooling program—and added advantages to meet engineers' and linemen's requirements.



Type SH

Type HT Prefilled

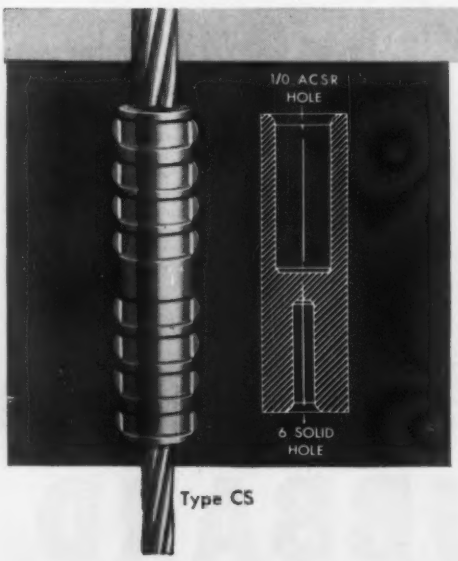
Type SH Prefilled



Type HT

Standardization now possible with Blackburn "H" frame connectors

- **Designed to fit the tools you already have for applying "H" frame type connectors.**
- **Full length tab completely seals out moisture, easiest to bend and install!**
- **Shot blasted to improve conductivity and retard corrosion.**
- **Prefilled with Blackburn's superior oxide-inhibiting compound, Contax, in easy-tear tab vacuum package.**
- **Color fast, large, easy-to-read lettering.**
- **Type HT is reversible, both grooves "open". For large aluminum tap to smaller copper main. Also used for dead ending.**



Type CS

You get higher conductivity with Blackburn service entrance sleeves

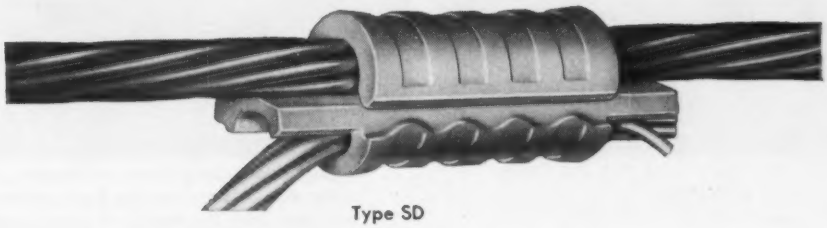
Blackburn—and Blackburn *alone*—provides greater contact area where needed, to assure greater conductivity. This is accomplished by increasing hole depth as the diameter of the conductor is increased, thereby providing more contact area for the conductors being connected.

The Color Coding is *printed* for quick, positive identification.

The sleeves' ends are sealed with Aluminum Sensitized Tape, which is easy to puncture . . . and, if a particle of the seal is pushed into the chamber, the particle is conductive.

Contax, Blackburn's superior oxide-inhibiting compound, is already in these sleeves *in measured amount*. Won't squirt out on glove or in face. And the solid center stop in a Blackburn Sleeve assures proper distribution of the inhibitor around the conductors. Designed for tooling you have.

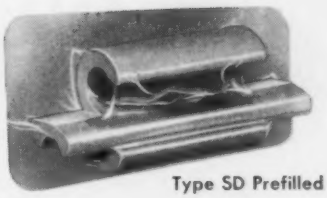
High "Use-Ability"



Type SD

Exclusive drip-guard separator in Blackburn 6-frame tap connector gives *extra* protection to bi-metallic connections

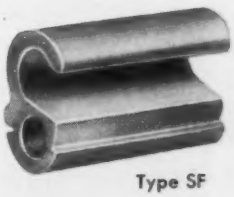
- Spacer allows SD Connector to be used for bi-metal connections with the tools you already have for "C" Frame type connectors.
- An economical substitute for "L" taps, since extended drip guard gives extra insurance against corrosion products bridging the bi-metallic gap.
- A true *two-handed* connector, very adaptable for hot line work.
- Shot blasted for highest conductivity and corrosion resistance.
- Prefilled with Blackburn's Contax and vacuum packed for insurance against corrosion.



Type SD Prefilled

Type SF

- Recommended for aluminum to aluminum.
- Spacer gives better protection against strand breakage.
- Can be installed with same tooling used for Type SD.
- Prefilled with Blackburn's Contax and vacuum packed for insurance against corrosion.



Type SF

Type TR

Blackburn neutral repair sleeves save dollars on triplex services

- Salvage short lengths of pre-assembled service drop cable with Blackburn Sleeves.
- Designed for and tested with the tools you already have.
- Extra length engineered for neutral pullout values in keeping with dead end devices.

See JB Catalog 858 for Tooling INFORMATION

LIVE BETTER ELECTRICALLY

JASPER BLACKBURN CORPORATION

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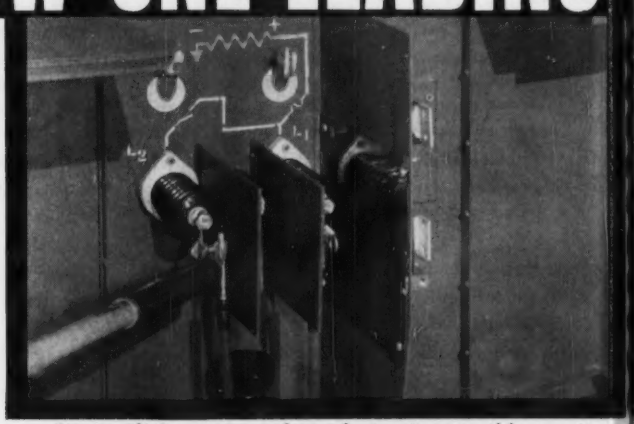
RT&E Terra-Trau IN

Area developer, by previous agreement with the utility, does trenching and pouring of concrete at his expense. Utility and developer cooperate in establishing final grade, so that uniform cable depth can be maintained.

Conduit bends for primary cable are positioned at transformer site. After ducts for both primary and secondary cable are laid, the trench at pad location is back-filled, and loose earth is tamped.

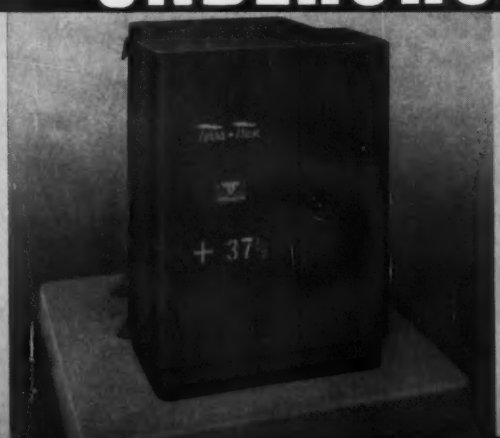
SHOW HOW ONE LEADING U

When homes are ready for service, transformer is brought to pad location and bolted to the pad by means of the studs set in the concrete.



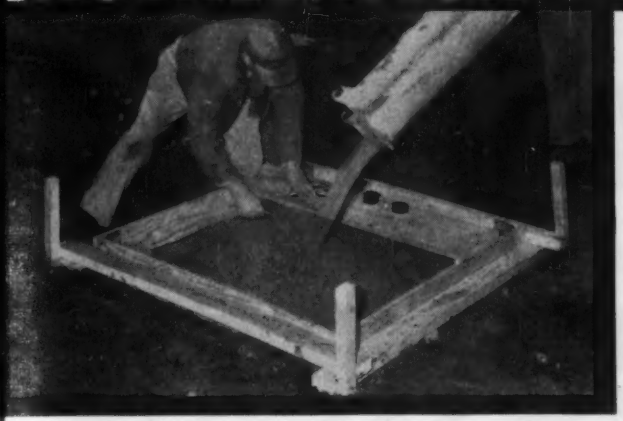
Stress relief cones are formed at primary cable terminations. Connections to transformer bushings are made by means of hot line clamps designed for either hand or hot stick operation.

UNDERGROUND DISTRIBUTION S



Terra-Trau ready for service. All that remains to be done is the connection of customer-owned secondary and final landscaping, to be completed as shown in this illustration.

INSTALLATION PHOTOGRAPHS



Wooden form for transformer pad is constructed at transformer site and concrete is poured. Both of these jobs are the responsibility of the area developer.

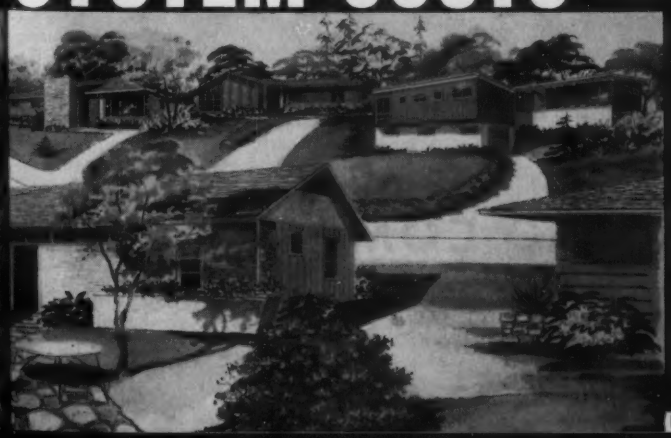
Direct burial primary and secondary cable is laid in trench and terminations brought out at transformer site.

UTILITY HOLDS DOWN

Lineman demonstrates method of removing or inserting bayonet-type high voltage fuse or disconnect switch that is used when energizing or de-energizing the Terra-Tran.

Secondary connections are made to complete the installation. Terra-Tran's green finish blends in with surroundings.

SYSTEM COSTS



RT&E

ENGINEERING TALENT CONCENTRATED ON ONE IDEA
A BETTER TRANSFORMER

CORPORATION

WAUKESHA, WISCONSIN
PORTLAND, OREGON

DD

Sangamo Capacitor

ALUMINUM

Stainless Steel Cases

Strong, lightweight open type units are easy to handle during installation . . . require minimum maintenance.

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

Equipments with RACKS...reduce weight per KVAR as much as 11 per cent

These Sangamo capacitor equipments give you the advantages of welded structural aluminum alloy racks—*plus* stainless steel cases as standard equipment—to assure long life under all atmospheric conditions.

Less weight per KVAR makes them easier to transport, to handle, and to mount. Maintenance costs are greatly reduced because of the excellent corrosion resistance, high strength, and long service life of these equipments.

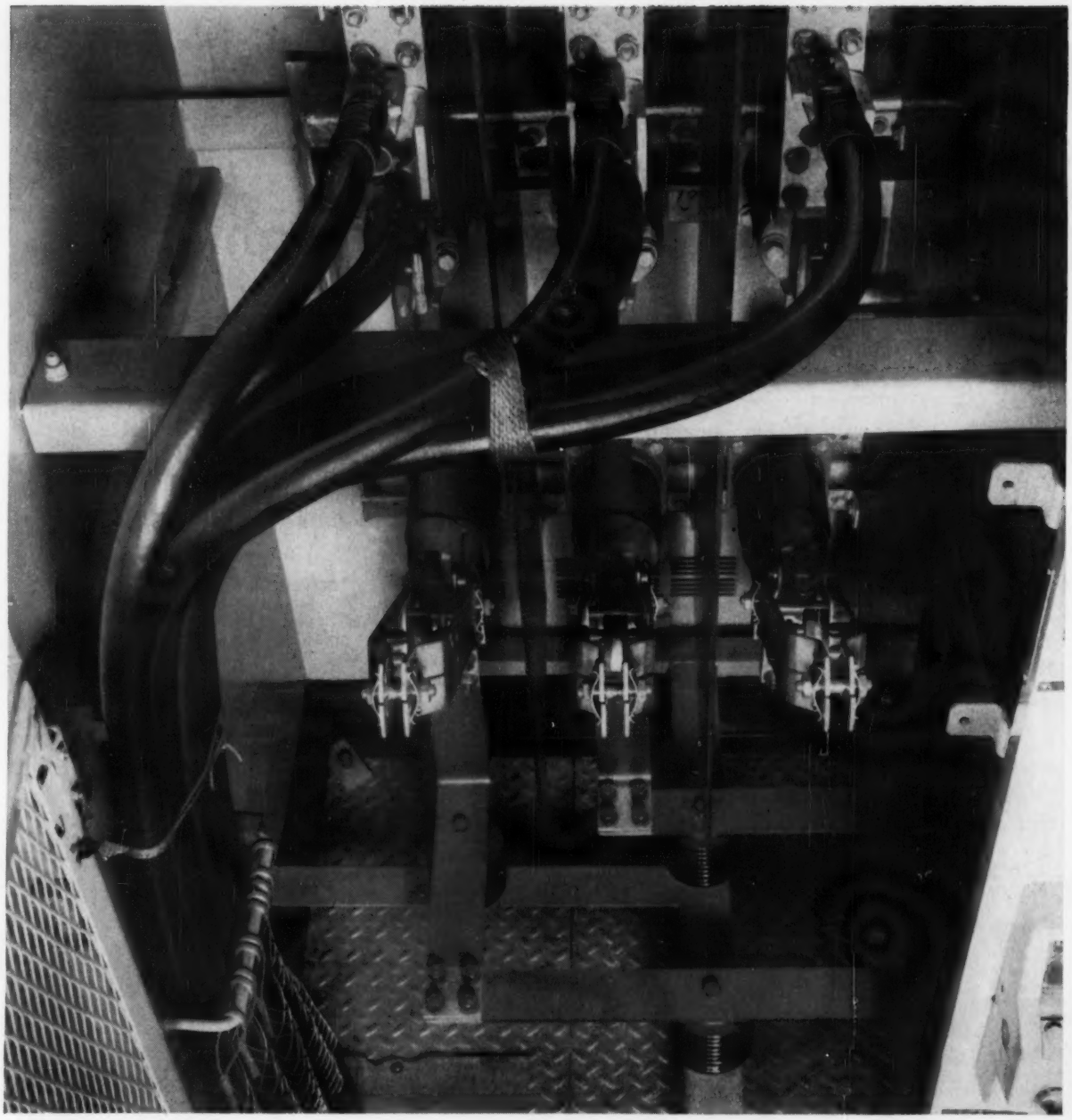
Sangamo pole-type equipments are available in In-Line, Multi-Row, and Cluster Mount assemblies in ratings from 150 to 1200 KVAR for use in distribution systems of 2.3 to 13.8 KV.

Open type equipments, composed of stacking units, are available for all high voltage applications.

For details, consult your Sangamo Representative, or write for Bulletins 1153 and 1154.

Sangamo equipments are real "pole-savers"... light weight keeps bending moment low.

PC59-2



FOR EFFICIENCY AND LONG LIFE *Specify Kerite Cable*

This 5KV unshielded cable used for power auxiliary service in an important new central station is typical of Kerite engineering to provide reliable installations in restricted space at minimum cost.

Plant engineers can "have their cake and eat it too." Hundreds of these Kerite non-shielded installations have been operating over the last 18 years without troubles or interruptions.

The reputation of Kerite insulation for long-lived resistance to the elements should make it the first choice of the power plant engineers.

KERITE CABLE

it's the **KERITE** *that makes the difference*

Our headquarters is at 30 Church St., New York 7.

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Ardmore, Pa., Boston, Cleveland, Chicago, Houston, San Francisco, Glendale, Cal.

Editorial Comment

MAY 4, 1959

Future for Street Lighting Sales Is Unlimited

Street lighting can be sold.

Anyone who still doubts this need only review the experiences of Connecticut Light & Power Co and its assistant commercial sales manager, Dick Ballard, as detailed in "The Connecticut Light & Power Street Lighting Story," (EW, Apr. 13, 1959, p 72).

From 1917 until 1953, street lighting revenue in CL&P territory had only increased an average of 3% a year, and by 1953 had just reached a million dollars. But since then, street lighting revenue has increased 65%, and the company expects to reach $2 million in revenue by the middle of next year. And, most significantly, lumen output multiplied almost 2½ times from 1952 to 1957.

How was it done? Mainly by aggressive promotion and salesmanship, in a well-planned and actively carried out program. Here are some of the lessons of that program:

- Get employees and civic officials interested in, and enthusiastic about good street lighting. Sell employees first and they'll convince the town officials. Reach employees with your street lighting message through company publications, contests, lead plans, etc.
- Make a street lighting survey of each town in your service area and present your findings to town officials. Dinner meetings are good occasions for this.
- Tell your street lighting story in special street lighting publications, through informational advertising, and on TV.

An important point which should spur intensive street lighting sales activity is the fact that saturation is a long way off. Only 50% of the country's main streets are lighted to "code," only 15% of the traffic streets, and a mere 2% of residential streets.

The future for street lighting sales is virtually unlimited. The incentive for sales should be great. Not only will your company gain revenue, but you will be doing something for your community in giving it brighter, safer streets.

Mobilizing Investors for Political Action

When Rochester Gas & Electric Corp asks its shareholders to "write their congressmen," you get the idea that the utility really means it, and is not just repeating a trite phrase. If you doubt this, then take a look at the impressive annual report recently sent out by the company.

Centerpiece of this report is a four-page insert outlining the company's political philosophy on four basic issues—the preference clause, the discriminatory tax and appropriation legislation, bond bills to permit TVA expansion, and REA loan policy. Mincing few words, Rochester Gas & Electric Management tells pointedly and succinctly its own view on each of these.

To aid its shareholders and friends in effectively voicing their position on these federal policies, the company has included with each annual report a handy directory of senators and congressmen listing both home and office addresses and their committee duties.

This is the most vigorous call to political action we have seen in an annual report this year—or for many a past year. We believe Rochester Gas & Electric is performing a service that stands to benefit all electric companies, their customers, and their investors.

Oregon Shelves State Commission Plan

Bill would have enabled state to become a BPA preference customer with powers to build hydro, steam and nuclear plants. Central Surveys U.S. trend in private-public elections

A bill for a State Power Commission, backed by the Oregon legislature's Democratic leadership, was killed April 20 by a vote of 29 for 28 against as proponents failed to muster the 31 votes needed for passage.

The vote climaxed one of the most intensive lobbying campaigns of the state legislative session and was almost on party lines. Four Democrats, however, resisted the party leadership. One Republican member voted with the Democratic majority.

Supporters of the measure said it would have enabled the state to become a preference customer of Bonneville Power Administration, thus assuring a continued supply of low-cost power for industrial growth of Oregon. The bill also provided that the commission could have issued bonds to construct hydro, steam and nuclear power plants.

Private utilities opposed the measure as a threat to their continued existence in Oregon. Although officially backed by the Oregon AFL-CIO, the bill was opposed by numerous local unions at the urging of electrical workers.

Earlier in the session, the bill was sent back to committee for attachment of a clause referring it to a vote of the people when sponsors realized passage without a referendum was impossible. It came back also amended to limit the power commission to wholesale distribution of power.

Proposal Defeated 4 Times

As it stands now, the proposal will be put to vote of the people in November, 1960. Voters have turned down four other similar measures in the past.

Only last November, Oregon voters emphasized their dislike of the State Power Commission idea by refusing to amend an existing constitutional provision to increase bonding authority of such a commission, if established. The vote was 291,662 against the amendment and 218,662 for.

These 1958 results and others involving public and private power concepts, have been tabulated by Central Surveys, Inc, and distributed in a Public Information Program report. From Sept. 20, 1957 to Dec. 31, 1958, there were 17 elections on the public ownership issue, the report states.

"Private ownership had majority support in ten of these elections, public ownership in seven," the report says. "In all of the latter, however, the issue was that of acquiring or leasing properties served by municipal systems. Private ownership won in every election that involved possible loss of communities already served by private power."

One community, however, is bucking this trend. Effective May 9, Hermann, Mo., will acquire the local distribution system owned by Missouri Power & Light Co. The changeover dates back to a 1945 bond issue which voters approved for a duplicating system. The city twice failed to have additional funds voted for a steam plant. Finally, in 1953 a tie line to the Southwestern Power Administration pitted the city against Missouri P&L, which had since become a Union Electric Co subsidiary. The competitive situation will cease by virtue of a court order pegged on MP&L's lack of a franchise.

Elections since the first of the year produced four added victories for private ownership. On April 7, Bolivar, Mo., defeated a $750,000 bond issue which called for the building of a system or purchase of Empire District Electric Co's local facilities. Unofficial count was 1,169 against the measure, 274 for.

Burkburnett, Tex., voted to accept Texas Electric Service Co's $972,000 offer for the local plant and system. The company received

Hamil Hails Success Story of

The financial condition of rural electric co-ops is both sound and growing, REA Administrator David Hamil testified in an early March closed hearing by the House Appropriations subcommittee on agriculture. His remarks were made public two weeks ago.

"From practically any angle," Hamil said, "these systems are financially sound, with good prospects for growth. Chart almost any phase of their economic history, and the curve climbs steeply. The rural electrification story is a success story if there ever was one."

Hamil pointed out, "Revenues have risen rapidly as power sales have climbed. There were about $321-million in gross revenues in 1952. It is now in the neighborhood of $563-million, and is increasing. The net margins in this same period of time have practically trebled; about $25-million in the year 1952 and it is approximately $73-million in 1958.

"Borrowers at the present time are in a pretty good cash position," he continued. "They have about $380-million in cash and investments, and while we do not have exact information on the purposes for which these borrowers intend to use this, we do know it is necessary for these people to have considerable working capital on hand, and for replacements, and for contingencies for meeting their obligations."

Spanks Trust Fund Proposal

Hamil indirectly spanked a proposed nation-wide co-op trust fund, being promoted by the National Rural Electric Cooperative Assn, by pointing out, "The recommendation that we make to the borrowers

a 50-year franchise and, in turn, deeded back to the city the plant and grounds. Vote on the offer was 670 for, 389 against.

Mandan, N. D. rejected a $1.8-million revenue bond issue to buy facilities of Montana-Dakota Utilities Co on Feb. 26. The vote was 1,779 to 1,025.

On Feb. 3, taxpayers of Herkimer, N. Y., approved sale of city's system and plant to Niagara Mohawk Power Corp by a 871-680 vote.

In summing up for the years 1946 through 1958, the Central Surveys report notes 240 local elections on the ownership issue. In 155 of these, private ownership won. "In many of the public ownership victories, change-over hasn't taken place, the report adds.

An earlier Central Surveys study covering some 34 elections during two-and-ahalf years prior to 1959 showed that 22 concerned the issue of transfering public power systems back to private ownership. In the preceding decade, about 60% of the elections involved company-served property.

Says William M. Longman, Central Surveys executive vp: "So in a sense it is now the other side that has been on the defensive, at least on this one particular front."

Since Sept. '57 Elections Have Gone...

13 For Private Ownership . . .

Key	City or Utility	For Private	Against Private	Company
EM	Anahuac, Tex	332	74	Gulf States Utilities
BIEM	Bolivar, Mo	1,169	274	Empire District
S	Burkburnett, Tex (muni)	670	389	Texas Electric Service
S	Herkimer, N. Y.	871	680	Niagara Mohawk
L	Lake Worth, Fla. (muni)	3,306 (1)	583	Florida P&L
EM	Mandan, N. D.	1,779	1,025	Montana-Dakota
CA	Oregon State	291,662	218,662	(2)
BI	Portland, Ore	87,492	45,755	(3)
BIEM	Springfield, Ore	2,350	2,095	Pacific P&L
S	Tri-County (N. J.) Co-op	1,817	548	Jersey Central P&L
S	Verde (Ariz.) Electric Co-op	231	80	Arizona PS
S	Walnut, Iowa (muni)	376	4	Iowa P&L
EM	Watford City, N. D.	271	244	Montana-Dakota

(1) Nullified because total fell short by 140 votes of required 60%.

(2) Would have increased bonding authority of State Power Commission, if established, and permitted construction of steam and nuclear plants as well as hydro.

(3) Three 8,000-kw generators were proposed for city's water supply system dams.

And 8 for Public Ownership

Decatur, Ind	1,227	1,500	Indiana & Michigan
Genoa, Ohio	309	509	Toledo Edison
Greenfield, Ohio	917	1,021	Dayton P&L
Miamisburg, Ohio	1,002	1,830	Dayton P&L
Minerva, Ohio	619	707	Ohio Power
Sleepy Eye, Minn	664	752	Northern States
Winnetka, Ill	1,708	2,997	Commonwealth Ed
Woodstock, Ill	753	777	Commonwealth Ed

Key—EM, establish municipal system; BI, bond issue; S, sale of utility's facilities to power company; CA, constitutional amendment; L, lease

Source—Central Surveys, Inc., and Electrical World

REA Co-ops

from REA who have funds in excess of those needed is that they pay ahead on their loans, or add necessary plant to their distribution area."

The REA Administrator questioned earlier testimony before the subcommittee by NRECA witnesses and the subcommittee chairman, Rep Jamie Whitten (D-Miss.), that a declining number of farmers in the U. S. would create a need for larger REA loans each year. "The record in most cases from borrowers from REA," Hamil said, "has indicated up to this point that the increased use of electricity, and by more people living in many cases in the rural area, even though they are not farmers, has exceeded the disappearance of those units actively engaged in farming."

Whitten said he would oppose any change in REA's "area coverage" clause, or the present method of co-op financing. "There is a considerable amount of agitation in support of some type of revolving fund, which is separate from this private financing," Whitten added. "In addition to having what amounts to a revolving fund (already), in my opinion, you have annual Congressional supervision."

In a later statement, Hamil noted that records have been set on the low level of delinquent repayments and the lowest average price by paid residential power users on borrowers' lines.

Only one REA borrower will be delinquent (over 30 days behind) on loan repayment on May 11—REA's 24th anniversary. And the average price paid by borrower's residential users will be about 2.68¢ per kwhr, he said.

The "average" co-op today serves 3,640 customers over 1,300 mi of line, has borrowed $2.9 million, repaid $500,000, and has a net worth of 16.4% of its total assets, he said.

Ike Vetoes REA Measure, Senate Overrides It

President Eisenhower vetoed the "REA re-organization" bill (S-144) last week, as expected. He called it "a major retreat from sound administrative policy."

The Senate quickly overrode the veto by a 64-to-29 margin. House action was expected last Thursday afternoon, as EW went to press.

Legislation introduced in the Senate by Hubert Humphrey (D-Minn.) and in the House by Melvin Price (D-Ill.) was intended to "free" the REA Administrator from any loan review rights by the Secretary of Agriculture. With National Rural Electric Cooperative Assn efforts, both bills passed easily.

In his veto message, the President said: "The REA has been working well and progressing efficiently under the existing administrative arrangements. The change in those arrangements would be contrary to the public interest."

Wheeling Battle Re-opens

'Appropriate integration arrangement' of U.S.B.R. and Idaho Power's Hells Canyon lines called for by Interior Dept

The Interior Department opened another round last week in its continuing battle with Idaho Power Co for wheeling rights on the company's transmission lines. This time, Interior appeared to be holding a club over the company's head in order to reach "an appropriate integration arrangement" between the Bureau of Reclamation and Idaho Power's Hells Canyon high lines.

Asst Interior Secy Fred Aandahl asked Chairman Jerome Kuykendall of the Federal Power Commission to "keep the door open" on the Hells Canyon license for a possible requirement that certain power lines, radiating from Oxbow and Brownlee dams, be made available to wheel federal power between Bonneville Power Administration and the bureau's southern Idaho system. This would be to firm up 13,000 kw for federal preference customers.

Aandahl specifically urged Kuykendall to:

1. "Reserve the right" to bring additional Idaho Power transmission lines, not now included in the Hells Canyon license, under FPC jurisdiction for required integration with federal projects.

2. Bring the company's existing, 230-kv Quartz-LaGrande transmission line (connecting IPCO with Bonneville) under the Hells Canyon license.

3. Place any new transmission lines added to the company's Bliss Dam under federal jurisdiction.

4. Amend the Hells Canyon license to permit federal irrigation, communication and power facilities to cross the rights-of-way authorized for IPCO's lines from Brownlee to Baker, Ore., and Boise, Idaho.

Aandahl said, "We have no reason to believe that our current negotiations with the company will not be satisfactorily concluded," but, "in the absence of agreement with the company on an appropriate integration arrangement, there would be required . . . license provisions similar to those already encompassed in the Bliss project . . . The inclusion of such provisions would . . . be within the commission's authority under the doctrine and for the reasons set forth in the Bliss case," he added.

The FPC has forwarded Aandahl's letter to Idaho Power Co for comments, and the company has not yet replied. The FPC, in turn, has not answered Aandahl's letter, and probably won't until it hears from Idaho Power.

POWER BRIEFS

Water resources study committee will include eight Democrats and four Republicans. The two-year investigation of U. S. water and power resources and needs through 1980 was authorized by the full Senate in mid-April.

TVA survey shows almost 200 new industrial plants located in the region during 1958 and 230 existing plants planned to expand. New plants and expansions represent a $300 million investment. The figure includes $60 million for facilities of TVA and its distributors.

"Save the Consumer" is slogan adopted by representatives of a group of Kentucky cities and rural electric cooperatives who voted to incorporate as "Citizens for Low-Cost Power." First objective is to obtain legislation permitting cities and co-ops to choose their source of power. Under present law, duplication of systems is prohibited.

O. Roy Chalk, owner of Washington, D. C. Capital Transit Co, offered to buy New York City's transit system for $615 million. Estimated present value of the subways, three power plants and other equipment is $1.2 billion. Meanwhile, Gov. Rockefeller signed legislation authorizing Consolidated Edison Co's use of the waterfront plant sites if the city approves Con Ed's $125.8-million offer.

FPC license application to build 247-Mw Round Butte hydro project has been applied for by Portland General Electric Co. FPC has granted new 50-year licenses for Georgia Power Co's redevelopment of 16.8-Mw Morgan Falls project and Southern California Edison Co's No. 1 and 2 projects on Big Creek. FPC also extended for two years the completion deadline for Seattle's Gorge High Dam.

Joint development of $38-million Coosawatee River is proposed by Georgia Power Co and U. S. Corps of Engineers. Engineers would build the dam and reservoir, the company would build and own the plant.

Humphrey Not 'Whole Hog' Advocate of Public Power

Sen Hubert Humphrey (D-Minn.) denied he is a "whole hog" public power advocate in a recent speech before a Democratic party dinner in the Tri-City area, Wash.

But he added, "I say to my friends in the private utility industry: in an economy of abundance, particularly here in the Northwest with your tremendous power potential, if federal development went forward as rapidly as it should, there would be an abundance of low-cost power for all—from the smallest little cooperative to the largest private power company."

He said there is "a place for federal development, for the federal yardstick in both hydro and atomic power."

Humphrey criticized the Eisenhower Administration for being "blind to the benefits of a giant power grid . . . we must build a power grid for the whole nation which will enable us to tie giant atomic reactors to hydro and steam facilities . . ."

Hanford Power Output Eyed

Plutonium producing project will be convertible to power take-off. If approved, output could total 750 Mw or more

One big question remained following the Atomic Energy Commission's authorization of construction work on a Hanford, Wash., plutonium producing reactor which could be convertible to power take-off. The question is: who will handle the power if the go-ahead is given for power production?

Output of the project could total 750 Mw or higher. Since the power marketing would fall under the Atomic Energy Act of 1954, which includes the preference clause, it seems probable that public agencies will receive the lion's share. Bonneville Power Administration might do the marketing or, perhaps less likely, the power might be distributed by a Northwest power group made up of public and private utilities.

Funds for the $145-million project were authorized by Congress last year. The AEC had postponed a final decision pending a restudy—then, in its effort to keep peace with the Joint Committee on Atomic Energy, finally cleared the way.

AEC authorized negotiations with Kaiser Engineers on April 20 for a cost-type contract. General Electric Co is handling design engineering and Burns & Roe will supply architect engineering services for supporting facilities. Construction will take about four years.

If authorized by Congress, the conventional generating facilities would cost an estimated $60 million.

Two A-Plant 'Simulators' to Aid Training

A versatile pair of instrumented units that play the role of a large nuclear power plant has been developed to help answer questions on atomic design and operation.

The two devices are a new "thermal plant simulator" and a reactor simulator. When combined with the reactor device, the thermal unit duplicates operating characteristics of virtually every type of A-plant except boiling water reactors, according to Brown Instruments Div, Minneapolis-Honeywell Regulator Co.

The thermal simulator, designed mainly for use as a training tool by colleges and universities, also can be used independently for nuclear plant studies and experiments, the company maintains.

The units duplicate full-scale plant reactions and effects by analog computing circuits which simulate the heat transfer in a steam generator. Instruments provide signals from the reactor unit to the thermal simulator. This controls the rate of fission.

NUCLEAR NOTES

First commercial production of nuclear power in continental Western Europe began April 22 when a 30,000-kw(e) reactor at Marcoule started feeding electricity into the French network. Primarily a plutonium producer, the reactor is fueled with natural uranium moderated with graphite and cooled with CO^2 gas under 220 psi.

Office of Atomic Energy, recently created by New York State, got legislative approval for a $1-million nuclear research center. University of Buffalo and the state's Roswell Park Memorial Institute will use the facilities jointly. Frank McCune, General Electric Co vice president, has been named chairman of the state's General Advisory Committee on Atomic Energy.

Contract for 160-Mw nuclear plant has been signed by Westinghouse Electric International and Italy's Societa Elettronucleare Italiania. Reactor will be pressurized water type. Completion date is 1963.

Enrico Fermi project's nuclear portion will cost $37 million, or $7.6 million more than the original estimate. Sodium cooling difficulties are blamed for the increase. Reactor rating—technically 100 Mw—may be raised to 154 Mw, matching Detroit Edison's turbine installation. Ultimately, a switch to a plutonium cycle may avoid economic dependence on that fuel.

Yankee Atomic Electric Co's $3-million generator stator reached the Rowe, Mass., site of the 134-Mw plant last week.

Study for 300-Mw plutonium fueled fast breeder reactor has been completed by Detroit Edison group led by Myron Beekman. Premised on 1965 operation, the study report calls for a symmetrical reactor container of 9-ft dia—5 ft less than Fermi—with 12-in. thick stainless steel shielding eliminated. Specifications call for 1,450 psi, 870 deg steam. Design indicates a net thermal efficiency of 37%.

Pacific G&E's Norman Sutherland, president, told a corps of touring newspapermen he thinks "nuclear power can be competitive in five years, not ten as some of the people in the East think." Some of the visitors filed stories stating PG&E would have at least one 200-Mw plant in service by 1965, but failed to spell out that this depends on getting the price down to 6.5 mills.

An agency to help southern states develop uses of atomic energy took the first of a long series of steps needed for its establishment. An advisory council approved a compact for an interstate nuclear board April 23. The plan must be approved by Congress and legislatures of the 15 participating states. One main objective of the board is to block complete federal control of atomic matters.

HEAT-STORAGE RESEARCH is needed to make solar heating, cooling practicable. Phoenix system saves $550 a year

MEXICO CITY session brought descriptions of Mexico's geothermic progress and Netherlands' re-use of old windmills

TIDAL power plant at St. Malo, France, has 32-ft dia water wheel installed

NETWORK of Denmark wind generators appears feasible based on 200-kw test unit. Cost goal is $40 per kw

Exchange of Ideas Planned To Tap Cheap Energy Potential

Plans for a technical World Meeting on New Sources of Energy have been mapped by the United Nations Economic & Social Council. At its annual meeting in Mexico City last month, the council members approved a resolution for a meeting sometime in 1961.

The conference will be held in the Soviet Union, France, or some other country where work in solar, wind, and geo-thermic energy is under way. Russians were approached in Mexico City on the degree of interest in a Moscow meeting, but no decision was disclosed.

Primary goal of the 1961 meeting would be to exchange ideas which could aid countries lacking fossil fuels or water energy to tap inexpensive natural resources until the day that nuclear power becomes economically feasible.

In reviewing progress, the council listed these developments:

Solar energy—Some 30 experimental solar furnaces are in operation, mostly in the U. S., France, and the U.S.S.R. A large installation planned for the Ararat Valley of Soviet Armenia is designed to generate 1,200 kw with a back pressure turbine. It would produce 11 to 13 tons of steam an hour at 400 C by means of 1,293 mirrors rotating about a central boiler.

New plastics promise performance and cost improvements as flat plate collectors and may lead to cheaper reflector-type collectors. "Solar pond" experiments in France and Israel utilize large, shallow, black-bottom tanks filled with water.

Solar space heating research is concentrating on means of heat-storage. Last year, it was reported that the Phoenix, Ariz., solar house type system could be utilized in about two-thirds of U. S. homes. The system costs about $4,000 more to install than conventional heating and cooling systems, but reduces these utility costs by $550 a year.

Geo-thermal — Mexico already has six wells going near Mexico City where a 3,500-kw test unit will begin production in about two months. Later, turbines of up to 200,000 kw will be installed. The cost for the test unit, which will not use a condenser, will be around $70 per kw. Future condenser-equipped units will cost about $140 per kw.

The 150,000-kw geo-thermic scheme now under construction in New Zealand will be on the order of $246 per installed kw.

Wind—A 200-kw machine with an 80-ft dia rotor has provided a technical advance of enough promise to merit a wind-power grid system in Denmark. Cost: slightly over $140 per kw and this figure can be lowered to $40. Holland is revamping its famous windmills with an auxiliary grid in mind.

Not on the agenda but of interest to many nations is the development at St. Malo, France where a tidal power plant is taking shape.

EEI Auto Group Views Equipment

Cincinnati meeting-goers see demonstration of automotive, mobile equipment, including new electric delivery truck

ARTICULATED HYDRAULIC BOOMS were prominent in the Cincinnati equipment demonstration given EEI group. Trenchers, back-hoes, wire stringing equipment were also featured, along with battery charging, power tools, metering items

Equipment demonstrations featured the EEI Automotive and Mobile Equipment Committee meeting in Cincinnati, Ohio, April 6-9. Articulated booms, digging and trenching equipment of all sizes and types, trucks and truck bodies, power tools for drilling, sawing, and cutting, special truck bodies for easy loading and for specific jobs, wire tensioning and stringing equipment, and the new electric delivery truck were put through their paces for fleet superintendents and others having special interest in automotive and mechanized equipment.

Heavier duties on electrical equipment on automotive vehicles have brought improvements in generators, generator regulators, batteries, and starter motors, W. C. Edmundson, Delco-Remy Division, General Motors Corp, told the meeting. Durability of electrical system equipment can be improved, at a price, he said, the price being often small. Generators have been made smaller. Development of ventilated generators, and the change to a 12-v system made this possible. Commutators, bearings, and other parts have been improved.

The new double-contact regulator helped solve the problem of keeping batteries charged when cars are driven in city traffic, where idling time is high. For heavy-duty vehicles, such as trucks, the new self-rectifying ac generator is meeting requirements for keeping batteries charged at low engine speeds. Small silicon rectifiers in place of the large selenium rectifiers have made this development possible, Edmundson said. A full transistorized rectifier is available but has not been used because of its cost.

Describes New Generator

A newly developed generator delivers 110 v ac for auxiliary power for tools and floodlights, said Edmundson. This generator is used by fire departments. It is an oil-cooled, 215-amp, 12-v, self-rectifying ac generator which can be used for ignition and battery charging duties. It can supply nearly 3 kw at 110 v for tools and floodlighting.

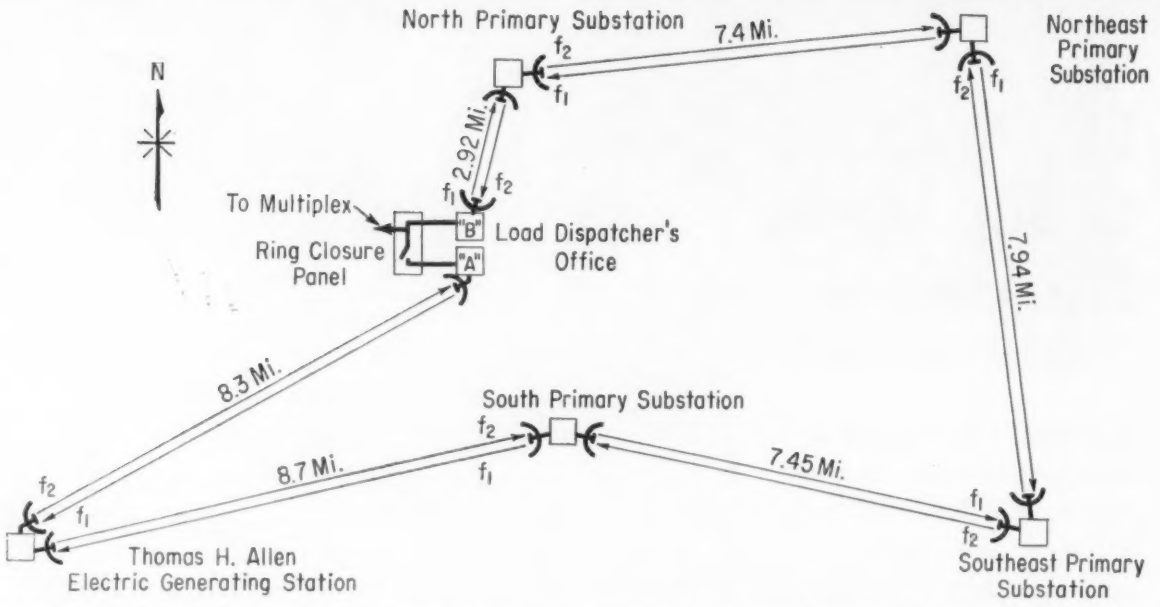
Edmundson indicated that Delco-Remy has an idea on motors for the new electric trucks and cars, but is not ready to announce it.

Train your drivers as you train your journeyman linemen, cable splicers, and other experts urged H. L. Smith, Ford Motor Co. He said that holding a license does not imply that a driver is an expert.

Supplementary electric supply for trucks and crews came in for special attention. Needs resulting from two-way radio and other increased electrical requirements of trucks, plus electric power requirements for tools while crews are on the job, were recognized.

A separate gasolene-engine-driven generator system for trucks was described by E. C. Swenson, D. W. Onan & Sons. He said that three types of systems are available: An ac generator with a dc charger; a special generator with a high ac output plus a dc output; a generator that provides high dc battery charging current only. Objection to the latter is the lack of ac power. The disadvantage of any of these systems is that they take truck space. But most provide adequate ac power for tools and floodlights without running the engine when the truck is standing.

A 1,200-w ac-dc generator that can be installed under the hood and driven by the truck engine was described by A. C. Ebersole, Kurland Motors. This unit has two windings. When producing ac it does not produce dc. But the combined ac and dc is sufficient to meet all requirements. For intermittent duty, said Ebersole, the generator can supply up to 2,400 w. It does not take up truck space, but the truck engine must be operated to drive the generator.



LOAD DISPATCHER'S OFFICE provides terminals for normal operation. If a propagation path is lost between two repeaters, lockout panels convert the stations on ends of the lost path to terminals that transmit in opposite directions

Looped Microwave Links System

Paths for 2,000-mc system follow routes of transmission lines around Memphis; no standby radio is maintained

A. H. GRADY, JR, Engineering Assistant, Memphis Light, Gas and Water Division, Memphis, Tenn.

A looped microwave system provides Memphis Light, Gas and Water Division with extensive, reliable communication facilities linking the new Thomas H. Allen generating station, the load dispatcher's office and four primary substations.

Transmission lines connecting the substations with each other and with the generating plant form a loop around the city of Memphis. Each of the four substations is an interchange point with neighboring utilities.

Signal Follows Line Routes

There is no stand-by radio frequency equipment on the system. Paths for the 2,000-mc signal generally follow the transmission line routes around the loop to a closure point at the load dispatcher's office. Stand-by protection against equipment failure is provided by an alternate path for any transmission.

During normal operation, the load dispatcher's transmitter-receivers are terminal stations, with intermediate stations acting as repeaters. Also, during normal operation, a ring closure panel located at the load dispatcher's office shows open contacts. All multiplex transmissions originating from the office are transmitted from "B" terminal and travel in a clockwise direction around the ring.

Intermediate Stations Repeat

Each intermediate station repeats the transmission and adds local intelligence. An unmodulated guard signal at a multiplex frequency is also transmitted from "B" terminal around the ring to "A" terminal. Multiplex transmissions from any station are received by all other stations.

Transmissions from "A" terminal travel in a counterclockwise direction around the ring and are repeated by each intermediate station. Under normal conditions, however, the only intelligence originating from the load dispatcher's office through "A" terminal is another guard signal that completes the ring and is received at "B" terminal. As before, repeater stations may add local intelligence.

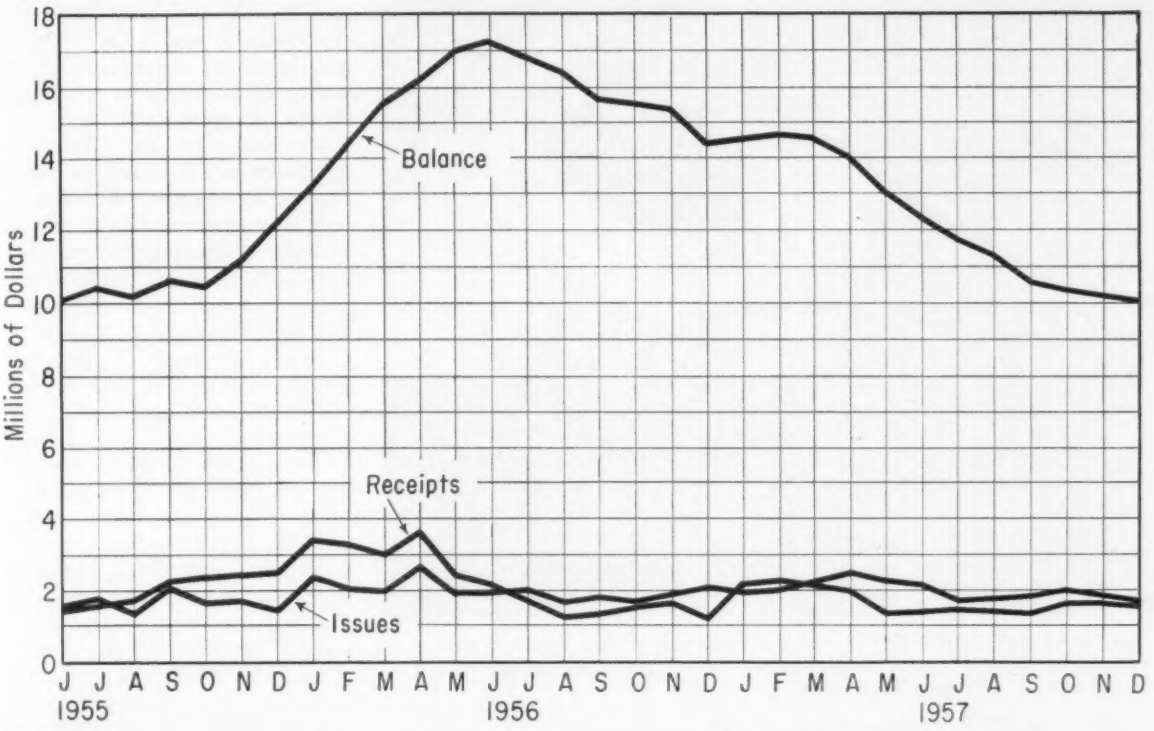
As long as the guard signals are being received by the respective terminal receivers, the ring closure contacts remain open. If, however, a propagation path is lost due to equipment failure between any two repeaters, ring lockout panels at stations on both ends of the lost path automatically convert those stations to terminals that then transmit in opposite directions from the fault.

Terminals Tie Back to Back

The guard signals are broken with loss of the path. This allows contacts in the ring closure panel to close, tying "A" and "B" terminals back to back, making the station a repeater. Again, multiplex transmissions from any station are received by all other stations.

The microwave system is loaded to nineteen channels, reserving eleven channels for future expan-

(*Continued on page* 110)



INVENTORIES at Commonwealth Edison Co have been reduced appreciably over a two-year period. Machine accounting supplies the reports that keep inventories trimmed down, and interested departments share responsibility

IBM Accounting Trims Stock

Inventory control at Commonwealth Edison is speeded by machine; is joint responsibility of several departments

W. S. MARKS, Manager, Stores & Inventory Control, Commonwealth Edison Co, Chicago, Ill.

Inventory control at Commonwealth Edison Co is a joint responsibility, in which engineering, construction, operating, and inventory control personnel cooperate. These combine to determine just how big inventories must be and thereafter to keep at the determined size.

Too much capital must not be invested in materials that will not be used for a long time after acquisition, and yet inventories must not sink to a point where service outages, or delays in construction, operation, or maintenance result. In finding this nice balance, the company uses a combination of automatic machine reports and an analysis of materials; hand-posted records for generating and switching stations' and substations' spare parts; and, requests from generating stations for replacement of working stocks.

Each of the system's seven divisions has a central storeroom. There is a major storeroom in Maywood, serving the technical center and system shops operations, and a general warehouse in Stickney for storage of reserve and spare parts.

Purchasing Function

Inventory control is a purchasing department responsibility, for which there is an organization of 53 people. About a third of these either have engineering training or its equivalent in experience. Such training or experience is essential to the task of determining what parts must be on hand for substation equipment, for keeping track of unassigned equipment, and for interpreting engineering requirements. Each division has a trained inventory control analyst.

Of the some 108,000 coded items in spare parts and utility stock, 12,000 are active. These are handled by machine accounting on IBM equipment. An average of 28,000 individual transactions are processed monthly through this equipment to obtain working inventory control reports. The transactions include material requests, returns to stock, transfers, receiving tickets, special counts, and material correction tickets. Major reports supplied by the IBM equipment are:

1. A weekly stock balance and use report on active items. This is the chief instrument for inventory control and for determining the need for replacement. It consists of individual tapes for active items only, the tapes listing new balances and quantities issued.

2. The semi-monthly activity report shows where the activity oc-

MACHINE ACCOUNTING has now become the inventory control routine and recent introduction of a larger machine should close up stores margins

curred, whether the transaction was an issue from or a return to stock, the quantity remaining at the end of the period, and other information useful for inventory control.

3. A monthly report of the balance on hand and the amount used at all major locations. This is used to check balances at each location and to reconcile book records with physical counts. Copies go to each division storekeeper for items stocked in his division. A complete report for all items stocked on the system is furnished to general inventory control.

4. A monthly report of capitalized inventories is used to prepare data for top management on the dollar status of inventories. It shows location, balance in dollars, increase or decrease from the previous month, purchases, returns to stock, issues from stock, and transfers.

5. A monthly utility commodity code report is also prepared. It is similar to the capitalized inventory report except that it is detailed by item code classification. It is used to analyze the dollar inventory position.

6. The annual equalization report shows item code number, location, value, quantity on hand, and the date of last activity for checking on slow-moving items with a view to disposition and other purposes.

7. A monthly price book report, detailed like the equalization report, is used to determine high value items. It analyzes and provides cost information for departments that make estimates.

Inventory control has been partially decentralized. Effective July 1, 1958, each division has responsibility for the high value items in that division, materials covered by blanket orders, and materials peculiar to a division's operation. Of the 12,000 machine accounted utility stock items, no division has more than 1,100 under its direct inventory control. These are about 75% of the dollar value of items stocked in each division.

Surpluses Checked

Personnel, who analyze orders in the divisions, use the weekly stock balance and use report of active items to determine which items have reached or are approaching a predetermined order point. When they decide that the stock must be replenished, a purchase requisition is issued in the division and sent to general inventory control. There a check is made to see whether the materials are in surplus elsewhere. When the material is not available from surplus, a purchase requisition is released to the buying division for ordering. General inventory control also uses the weekly stock balance and use report of active items to determine whether stocks of items under its control should be replenished.

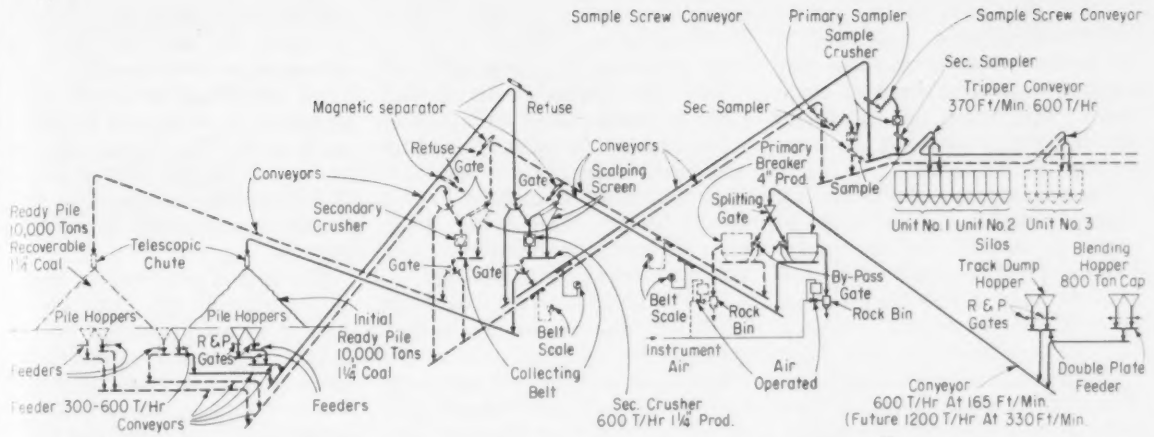
An equipment and material requirement list, furnished by various engineering departments, lists unusual requirements for planned construction. This important tool is the responsibility of the order analyst of such materials, who must see that the needed material is on hand.

Unlike the setup of most companies, inventory control for generating and switching stations, and substations is handled by a section of the inventory control organization. Hand-posted records are maintained for certain testing department materials, major unassigned equipment, substation and transmission terminal spare parts. The ordering procedure includes a review of all new equipment and a determination of parts needed for repair and maintenance. This function is handled by the station and substation section of the inventory control group working with the engineering and operating departments. An analysis of each case determines replenishment.

For initial ordering of spare parts for generating equipment, the inventory control group, generating stations department and engineering department coordinate their knowledge and manufacturers' recommendations to assure having on hand the spare parts for equipment overhauling. Orders for these spare parts are originated by the inventory control group, whose responsibility it is to see that there is not too much investment tied up in duplicate items at several generating stations.

Each of the 12 generating stations maintains its own working stocks in a storeroom controlled by the stores department. Reordering is by issuance of a purchase requisition or by giving the inventory control group some other notification of requirements. This group reviews the request. When material is not available through transfer, a purchase order is issued.

Recently Commonwealth Edison installed an electronic computer with a capacity much greater than the machine furnishing inventory control reports.



COAL HANDLING SYSTEM for a plant firing raw coal has many special features. Although building these puts construction costs higher than for placing a station at the load center, burning washed coal, there are equalizing factors

Mine-Mouth Station Pays Off

Raw coal generation gives Kansas City P&L's Montrose edge over site involving fuel and energy transportation

J. A. KEETH, Vice President, Kansas City Power & Light Co, Kansas City, Mo

Fuel supply and costs dictated the site selection of Kansas City Power & Light Co's Montrose steam plant, now under construction. Its first unit, 175-Mw capability, was placed in service recently.

Montrose is a mine-mouth plant, coal being delivered for only 12½¢ a ton more than the cost of hauling it to the mine tipple for loading into rail cars for shipment. Considering that freight rates from south Missouri coal fields have risen from 75¢ per ton in 1946 to $1.62 per ton today, this 12½¢ delivery cost represents an appreciable saving. This saving must be balanced against transmission costs, as the company's load center is 60 air miles away in Kansas City.

KCP&L thoroughly investigated Missouri, Kansas, and Oklahoma coal reserves and concluded that prompt action should be taken to assure coal sources for as long as possible within moderate freight hauls of generating stations. Studies showed that proved Missouri reserves would supply for only about 30 to 35 years. Accordingly, the company developed a plan to reserve south Missouri coal for future use. A contract signed in 1955 with Peabody Coal Co and another being prepared earmarked Henry County Coal for KCP&L.

Many potential sites were explored in planning more system capacity in 1955. Until then all the of the system's 700 Mw of generating capacity was in Kansas City. The last unit had been installed at Hawthorn station. This station is expandable, although several complications would be involved, particularly enlargement of coal handling facilities and the circulating water system. Grand Avenue station had reached the limit of economical expansion, and further expansion at Northeast station appeared inadvisable. It was concluded that expansion would be at a new location.

Water Available

Most sites considered were on the Missouri River where cooling water would be available, and two or three were mine-mouth sites away from the river. Analysis of the merits of plants at many of these sites, taking into account cooling water supply, fuel, and the transmission of energy to Kansas City showed that Montrose offered the most. It had a large tonnage of usable coal available and posed no transportation problem.

The opportunity to develop water for condensing was present. A condensing water reservoir was created by damming Deepwater Creek which has a 140-sq-mile drainage area above the damsite and produces flood flows as high as 35,000 sec-ft. During much of an average summer, however, there is little or no flow.

A 3,500-ft earth dam with a 140-ft concrete spillway section now holds back enough of the flood waters to create a reservoir of 25,000 acre-ft, or 1,800 surface acres. The full reservoir stores enough water for the plant to carry through three of the dryest seasons.

Initial plans for Montrose called for two units having a total capacity of 350 Mw by 1960. All engineering has been completed for the second unit, whose construction was started last August. Recently the decision was reached to install a third, 175-Mw unit, for operation in 1963 or 1964.

Montrose plant is essentially the outdoor type. No equipment is below grade, and the heavy pile-supported foundation slabs at about grade level carry all turbine, boiler, and auxiliary equipment. The turbine is on a pedestal 30 ft above the slab, the condenser being mounted crosswise under the turbine exhaust. Space below the turbine floor is enclosed and includes some turbine auxiliaries also. Turbine and generator are out of doors and are served by a 50-ton gantry crane.

Auxiliaries are in an enclosed,

two-floor bay next to the turbine and extending from grade level to the turbine room floor. This bay supports extraction heaters, evaporator, deaerators, and feedwater storage tank, all out doors above the turbine floor elevation.

Selection of units of 175-Mw net capacity marks a substantial increase in unit size for the system. Largest previous units were two 100-Mw units at Hawthorn station. Growth of system load, capacity, and interconnections with other systems justified the increase. Furthermore, the ability to reduce plant costs, as well as operating expenses, through larger units was decisive. Montrose units were designed for operation with a throttle pressure of 1,800 psi and a throttle and reheat temperature of 1,000F, the highest operating conditions justifiable by the low fuel costs.

Boiler Outdoor Type

The turbine is a double-flow, tandem-compound, 3,600-rpm design, arranged for six stages of feedwater heating plus deaerator. The generator is designed for 200,535 kva at 22 kv and 0.85 pf using 31-lb hydrogen pressure with a supplementary rating of 220,588 kva with 45-lb hydrogen pressure. Field and core are cooled by hydrogen in the usual manner, and the armature is liquid-cooled through hollow conductors containing transil oil. The exciter, direct-connected through a reduction gear, has a rating of 850 kw at 375 v. The turbine has a "skintight" weatherproof lagging, and the exciter and collector rings are protected by a step-in weather-type enclosure.

The condenser for the turbine is a single-pass unit with divided water boxes. Tubes are ⅞ in. OD, 17 Bwg Alclad aluminum 30 ft long. A rubber expansion joint connects the rigidly supported condenser to the turbine. Circulating water comes from the inlet canal through an outdoor screen structure which includes the circulating pumps, service water pumps and motor, and engine-driven fire pumps. The structure, completed for two units, can be extended for a third. To prevent algae growth in the aluminum condenser tubes, a chlorinating system was installed for the circulating water.

Steam is supplied by a controlled-circulation boiler, outdoor type. Boiler rating is 1,260,000 lb per hr from feedwater at a temperature of 470F. The furnace is the divided type, a water-cooled curtain wall separating the furnaces. Superheat and reheat temperatures are controlled by tilting burners and spray desuperheaters. One boiler gauge glass is pictured in the control room through closed-circuit television.

The boiler is pulverized-coal fired. There are 20 corner burners in each furnace, five in each corner. All burners are arranged for automatic control of tilt and have remotely controlled secondary air dampers. Because of the high ash content of the coal and its relatively low fusion temperature, the furnaces were designed for a maximum heat release of 85,000 Btu per sq ft per hr of projected heat-absorbing surface. This feature, along with a low furnace exit gas temperature and a liberal arrangement of soot blowers, facilitates the use of coal containing as much as 24% ash.

Montrose's use of raw coal dispenses with preparation costs. Thus fuel cost per million Btu is 22% less than at Kansas City. While the cost of building a station at the mine mouth for use of raw coal is higher than building one at the load center burning washed coal, overall power production costs, including fixed charges, bring savings more than enough to cover transmission costs.

Run-of-mine coal will be delivered to the plant unloading hopper by 50 to 70-ton trailer trucks at a rate of about 3,000 tons per 7½-hr shift, or by special self-dumping 100-ton railroad cars. At times delivery will be by trucks and at other times by rail, and occasionally coal by both. As coal may be in lumps 1 to 2 ft across and 10 to 12 in. thick, special treatment in the way of hopper outlets, feeders, belt conveyors, breakers, and crushers have been provided.

A 40 by 40-ft, 400-ton unloading hopper was installed with a double track at grade level. Coal from the hopper is fed by reciprocating feeders onto a 60-in. inclined belt which delivers it to a breaker. There size is reduced. Coal from the breaker is fed over a scalping screen to remove the reduced coal, the remainder going to a ring crusher for reduction. Coal from the crusher and scalping screen goes by 36-in. belt from the transfer tower either to the ready pile and permanent storage or to the coal bunkers. Ready piles, amounting to about 20,000 tons, rest on reclaiming hoppers at grade level. The hopper discharge by way of feeders onto a belt or belts, returning the coal to the transfer tower and thence to the plant bunkers.

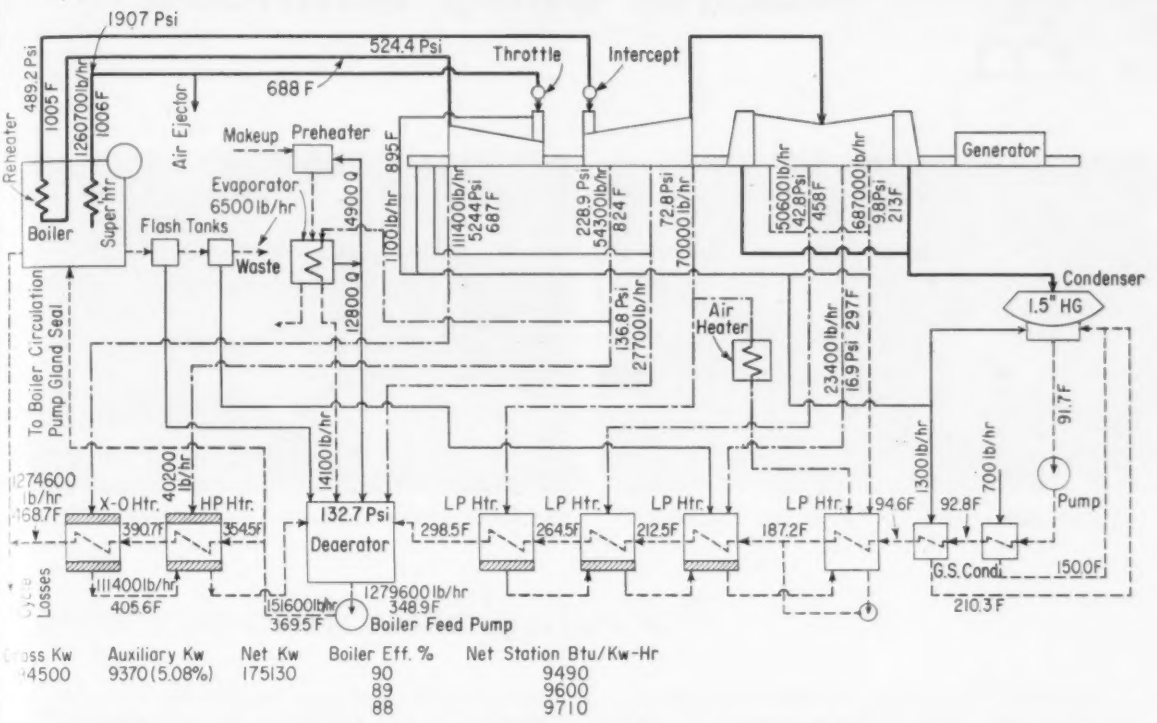
The cost of preparation, conveying equipment, and bunkers large enough to carry through the non-delivery days with a reasonable margin would have been very high. Therefore, during delivery days, the bunkers are kept filled, and coal is deposited also in the ready pile over the grade reclaiming hoppers from whence it can be recovered by conveyor operation without extra labor. The ready piles and inactive storage are a reserve which eliminates duplication of a large part of the conveying and crushing equipment. Coal is moved from ready pile to storage by large wheel scrapers and tractors. Coal from the permanent storage is delivered to a recovery hopper by dozer or scraper.

Capacity 600 Tons

Each special hopper car holds 100 tons of mine-run coal. The cars are self-emptying through two sets of air-operated clam-shell doors which give a free opening in the bottom. Either train or station air operates the doors, and the cars are virtually free from internal braces which would tend to hold up coal flow. Cars can be spotted and emptied in less than 1 min.

It became apparent, after installation of the coal-handling equipment, that one coal seam, constituting a considerable part of the station's assigned coal, contained too much sulphur to burn without corrosion problems. The other seam is reasonably low in sulphur. To use both seams, Peabody was authorized to blend the two coals to produce a composite within the contract specifications which can be burned effectively by the equipment installed. The coal company constructed a blending facility next to the station unloading hopper.

The initial coal-handling system has a capacity of 600 tons per hr, a capacity that can be doubled for future units by making minor changes. But, as the plant expands, the handling of coal on two or even



Gross Kw	Auxiliary Kw	Net Kw	Boiler Eff. %	Net Station Btu/Kw-Hr
184500	9370 (5.08%)	175130	90	9490
			89	9600
			88	9710

NET **HEAT RATE** predicted for Montrose plant is 9,710 Btu per kwhr when the unit operates at full-load capability of 175 Mw and 1½-in. hg back pressure. Annual heat rate of Montrose has been estimated at 9,900 Btu per kwhr

three shifts will eliminate the need for expanded facilities. As the coal has an extremely high ash content at relatively low fusion temperature, considerable attention was given to ash handling.

The furnace is the dry-bottom type with water containment for quenching clinker or slag. Four outlets, each with a clinker grinder, feed to a flushing system sluicing the ash to a fill 1,200 ft away. Pyritic discharge from the pulverizers is carried by a separate sluicing system to the main ash pit where it combines with bottom furnace ash. A bottom-ash silo will be installed over a railroad track when the fill area is used up. It will receive ash from the same sluicing system and provide for decanting the conveying water.

Fly ash collected from the plant amounts to about 300 tons per day per boiler. As there is usually a market for this material, facilities for storing and loading closed hopper cars have been provided. Fly ash accumulated in the several hoppers in the gas duct system and the dust-collector hoppers is normally handled by a pneumatic system to the silo. During periods when the ash is not sold, it will be handled by an auxiliary sluicing system through the same discharge line to the fill which takes the bottom ash.

Control Centralized

The station has one central control room, so that the number of men for operation is a minimum. This control room will be used for one, two, or three units. It was built large enough for two units and can be expanded for one more. All essential plant control, except coal-handling equipment, is in this room. Console-type boards have small indicating instruments arranged functionally. Recording instruments are behind the boards to save board space. The control room is air conditioned and has provisions for keeping instruments free from dust.

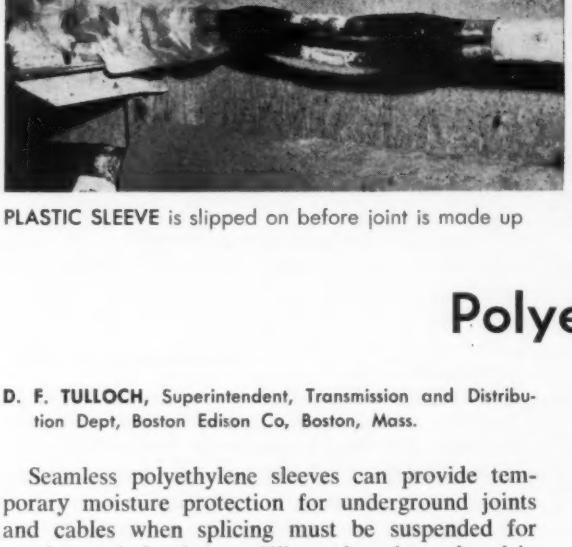
Generation is nominally at 22 kv. Generator leads are tied directly through partially metal-clad buses to a 195-Mva, 3-phase tap-changing transformer between the turbine and the 154-kv switchyard. The transformer's high-voltage side is tied through disconnects and a breaker to a section of outdoor ring bus. There are two 57.5-mile, 154-kv transmission lines to Kansas City, and a line will be added for each new unit.

The 12-Mva OA station auxiliary transformer is tapped directly off the bus between the generator and main power transformer. A start-up transformer of 10 Mva OA capacity takes energy from the 154-kv bus and steps it down to 4 kv for start-up. All transformers have an automatic spray-water system for fire protection.

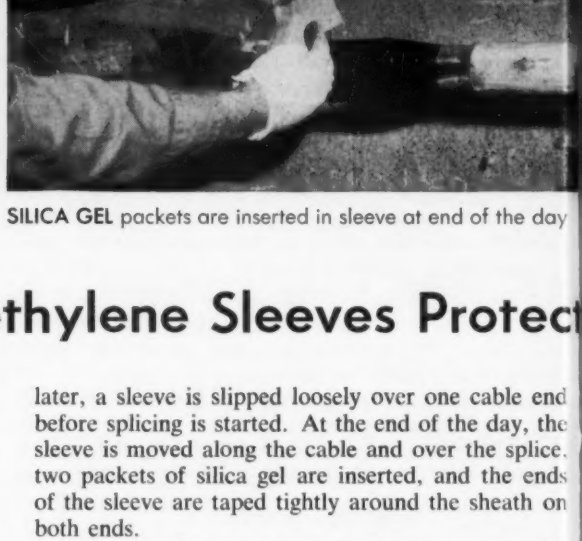
Auxiliaries are motor-driven, except an emergency fire pump and generator. The latter are gasoline-engine driven. All motors above 200 hp operate at 4 kv. Smaller motors, except those of fractional horsepower, operate at 480 v.

The predicted plant net heat rate at full-load capability of 175 Mw and 1½-in. hg back pressure is 9,710 Btu per kwhr. This is based on a conservative boiler efficiency of 88% which makes allowance for the low-grade fuel. Taking into account load factor, average vacuum, and variable operating conditions, it is predicted that the annual station

(*Continued on page* 110)



PLASTIC SLEEVE is slipped on before joint is made up



SILICA GEL packets are inserted in sleeve at end of the day

Polyethylene Sleeves Protect Ca

D. F. TULLOCH, Superintendent, Transmission and Distribution Dept, Boston Edison Co, Boston, Mass.

Seamless polyethylene sleeves can provide temporary moisture protection for underground joints and cables when splicing must be suspended for varying periods of time. Silica gel packets placed in the sleeve absorb any moisture trapped in the sleeve during installation.

Whenever it is desired to stop splicing operations at the end of a regular work period and continue later, a sleeve is slipped loosely over one cable end before splicing is started. At the end of the day, the sleeve is moved along the cable and over the splice. two packets of silica gel are inserted, and the ends of the sleeve are taped tightly around the sheath on both ends.

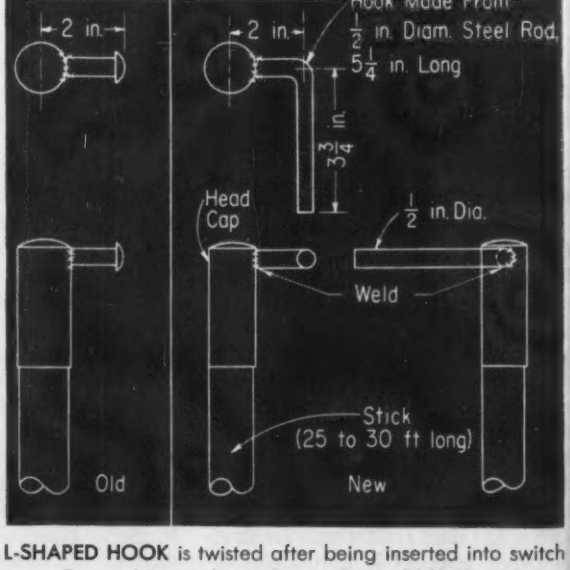
The polyethylene sleeve is then covered with heavy waterproof paper, which is taped to the sheath on each end. The paper affords mechanical protection for the sleeve. When splicing is resumed, the sleeve is untaped and moved back over the cable.

Angled Hook Eliminates Slipping

CECIL CRAWFORD, Maintenance Man, Substation Dept, Ohio Power Co, Crooksville, Ohio.

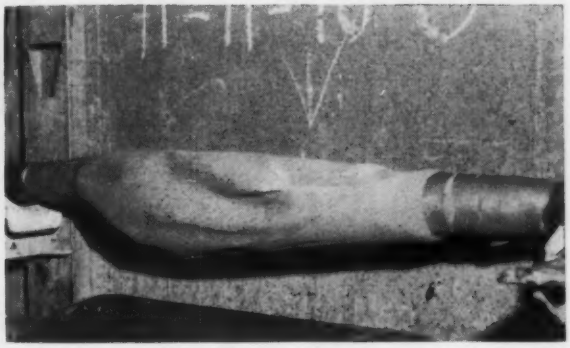
Slipping of hook sticks from disconnect switch or breaker rings can be eliminated by using an L-shaped hook developed by Ohio Power Co. The new hook can be mounted on a conventional hook stick for about $2.

The 3¾-in. arm of the hook is inserted through the switch ring, and the entire stick is rotated 90 deg. In this position the hook cannot become disengaged from the ring. Formerly, sticks which slipped from switch rings often caused damage to switch insulators.



L-SHAPED HOOK is twisted after being inserted into switch ring. One weld completes change from old hook

SLEEVE IS TAPED to lead sheath, sealing moisture out



WATERPROOF PAPER cover provides mechanical strength

Cable From Moisture

The sleeve is cut off and discarded when it is certain that splicing operations will continue without further interruption. No attempt is made to reclaim the silica gel.

Whenever a troubleman locates a failure in a joint or section of cable, a moisture analysis is made to determine the extent of repairs necessary. The troubleman then applies the polyethylene sleeve over the joints and cable ends that are to be spliced later and inserts the silica gel packages. He then tapes the ends of the sleeve around the lead sheath.

The polyethylene sleeves are 0.005-in. seamless tubing 40 in. long and 8 in. wide when flat. Silica gel comes in small (⅓-unit size) porous paper packages. Five ⅓-unit packages are packed in air-tight press-cover cans by Boston Edison personnel. Kits of six sleeves and three cans of silica gel packets are supplied to all splicing and trouble crews.

Adaptation of a paper presented at a recent meeting of the Transmission and Distribution Committee of the Edison Electric Institute.

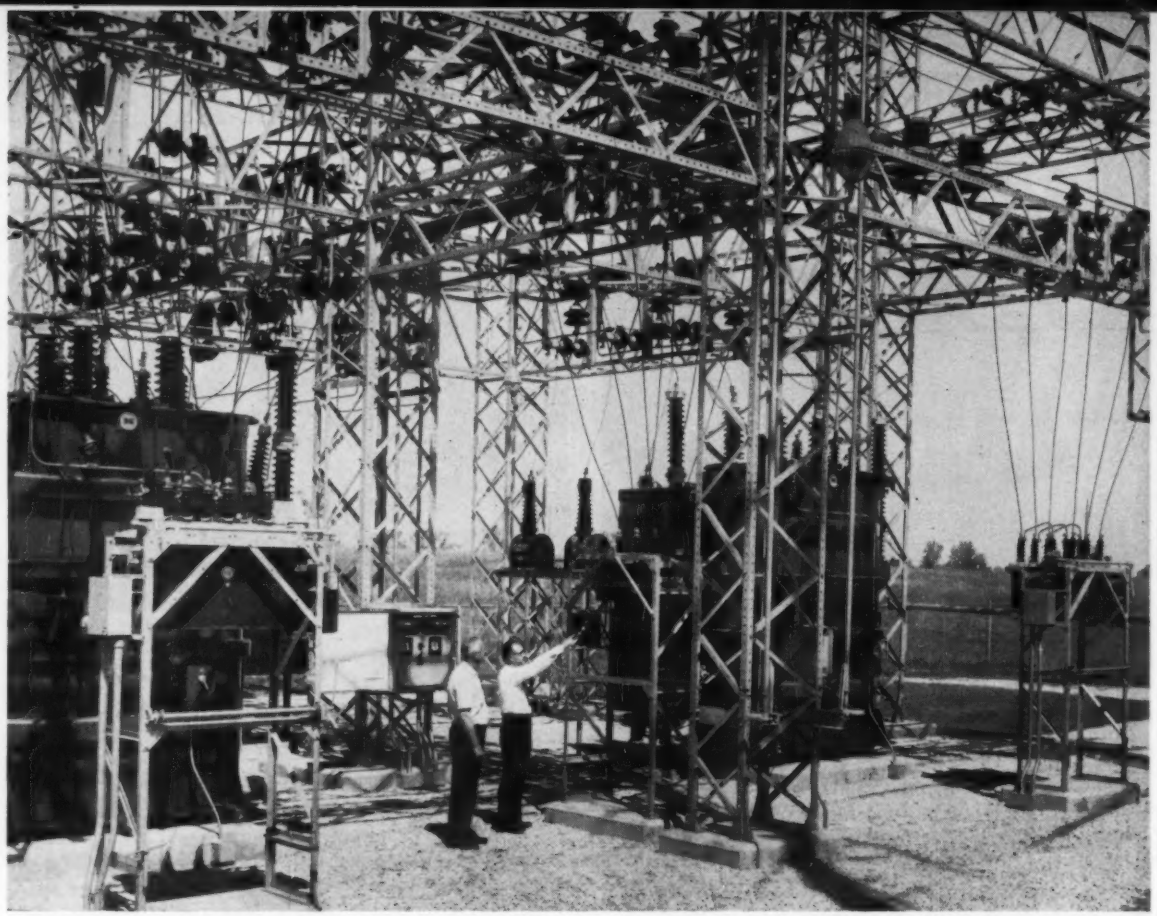
Twirlers Scare Woodpeckers

A colorful plastic whirligig or twirler, used in thousands of used car lots and gas stations throughout the country, is Public Service Company of Oklahoma's new weapon in the battle to prevent woodpeckers from destroying transmission poles. The company has made 25 installations in four different areas, that had suffered considerable damage from woodpeckers.

Where H-Frame construction is used, the twirlers are installed on a wire strung between the two poles. The twirlers are mounted directly on single poles. They whirl rapidly in the slightest breeze, and it is hoped that the motion will frighten the wary woodpeckers.

Experience indicates that the twirlers will keep the woodpeckers away for one hatching season. Operating people feel that if the birds stay away for one year, they will stay away forever.

The twirlers can be obtained from the specialty dealers who supply gas stations.



DUPLEX SUBSTATIONS were built by Illinois utility with reclosers on the automatic transfer scheme. This layout achieved a saving of $48,000 for three substations and improved service continuity in supplying all loads

Saves $48,000 on 3 Substations

Municipal uses heavy-duty reclosers and automatic transfer scheme, attaining economy, increased reliability

D. E. WISLEDER, Superintendent and Chief Electrical Engineer, Department of Water Light and Power, Springfield, Ill. and
W. WIECHMANN, Application Engineer, Line Material Industries, Milwaukee, Wis.

Greater service reliability and economy were achieved on the City of Springfield system through the use of an automatic load-transfer scheme for three new distribution substations. Each two-feeder, two-transformer substation uses oil circuit reclosers for effective feeder protection, and each station has remotely controlled bus-tie switches that are actuated from a transformer secondary. The arrangement provides a duplex or double-ended operating scheme at a cost well below that of equivalent stations equipped with relayed air circuit breakers.

Because of the demand caused by summer peak loads, studies were made with a view to revamping the 2.4/4.16-kv distribution system of the Springfield Water, Light & Power Department. For this purpose 7.2/12.47 kv was selected as the distribution voltage. The new voltage provided increased capacity and made service continuity more important.

Duplex operation was considered advantageous because:

1. The low-voltage bus could be segregated, thereby permitting use of switchgear less costly than enclosed switchgear.

2. Fault interrupting duty would be based on the single bank rating.

3. Service continuity to all loads would be improved.

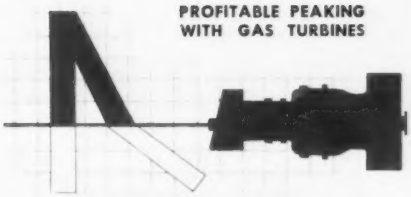
4. Equipment would be rated to carry the total station load on one transformer-recloser unit.

5. Stations would be expandable, facilitating inexpensive growth.

6. Cost estimates indicated that a duplex station, employing reclosers and an automatic load transfer scheme, could be erected at a saving of several thousand dollars.

Thus three new duplex substations of the type in the photograph were built at saving of about $48,000 through the installation of the automatic transfer scheme with reclosers. Each station is rated 10,000 kva, 69 kv stepped down to 7.2/12.47 kv. Transformer capacity is divided into two load tap-changing 5,000/6,250-kva banks at each sub-

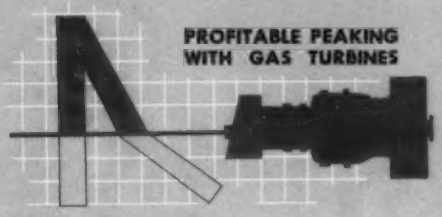
(*Continued on page* 69)



NEW General Electric Gas Turbine Specifically Designed For Economical Peaking Applications

GENERAL ELECTRIC

◀ FOR COMPLETE DETAILS, FOLD OUT



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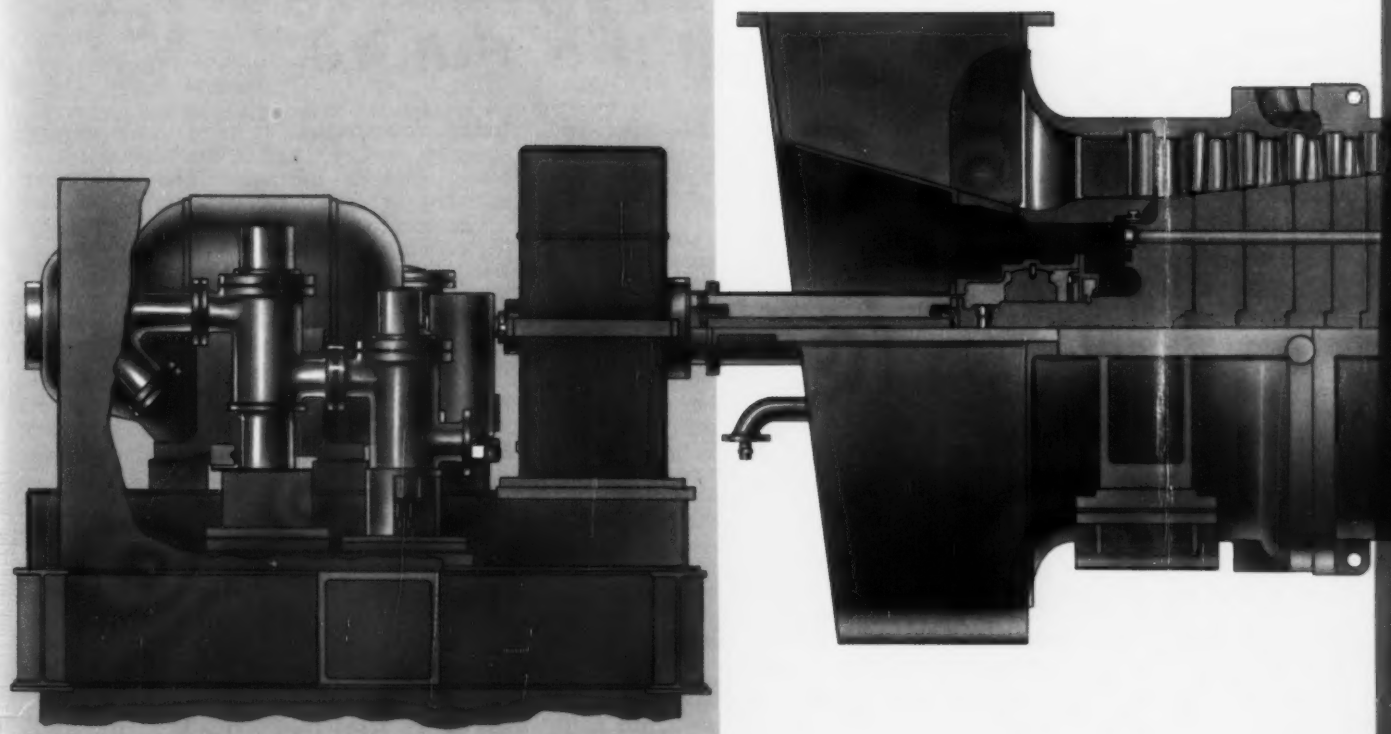
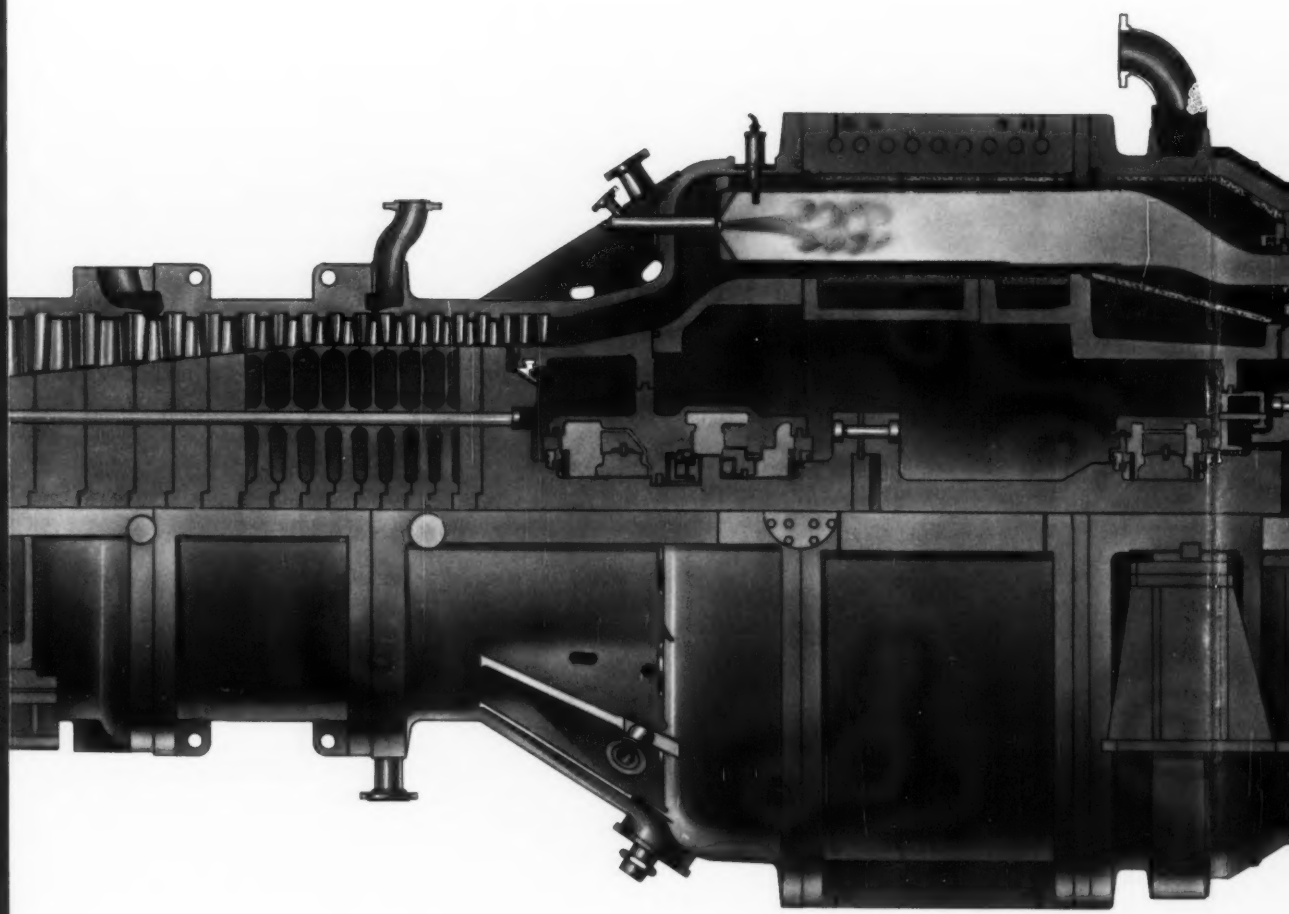
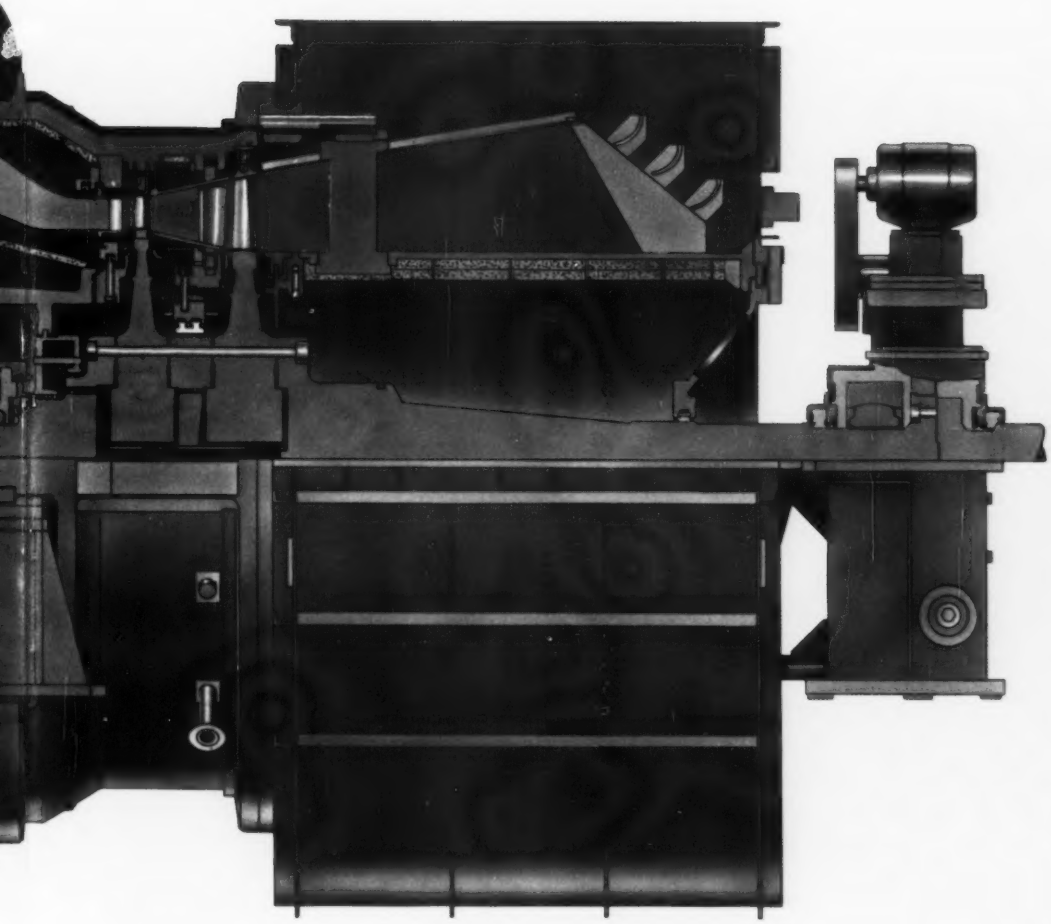


The NEW 20,000-25,00

Single-shaft General Electric



000 Kw Simple-cycle,
ic Gas Turbine for Peaking



GENERAL ELECTRIC

HERE ARE IMPORTANT REASONS WHY . . .

General Electric Gas Turbines Offer The Economical Answer To Varied Peaking Requirements

LOWER INSTALLED COSTS

Depending on the specific application, General Electric gas turbines install for $110 to $130 dollars per kilowatt and can save up to $50 dollars per kilowatt in additional system investment. Low space requirements, minimum foundations, simple building requirements, flexibility in site location, and basic design simplicity lower initial investment expense.

LOWER OPERATING COSTS

Lower operating labor, maintenance and standby costs all contribute to reducing operating expenses. Gas turbines require no attendance or auxiliary service during periods of inoperation. Total fuel costs are low because of the short duration of peak loads. Lube oil consumption is negligible. No deterioration takes place while the unit is not operating.

HIGHER RATINGS IN ONE UNIT

General Electric's peaking gas turbine is designed to produce 20,000-25,000 kilowatts. Larger units are planned to keep pace with system load growth. Because one gas turbine of this size produces over 10 times more kilowatts than simple building block units, space, installation and maintenance costs and control complexity are reduced.

LIMITED SPACE

General Electric's 20,000-25,000 kilowatt gas turbine is a compact, self-contained unit 67 feet long, 15 feet wide and 10 feet high. Only a small, inexpensive building is required. A typical station is only 15,000 square feet. This includes all station services, auxiliaries, switchgear, transformers, and controls.

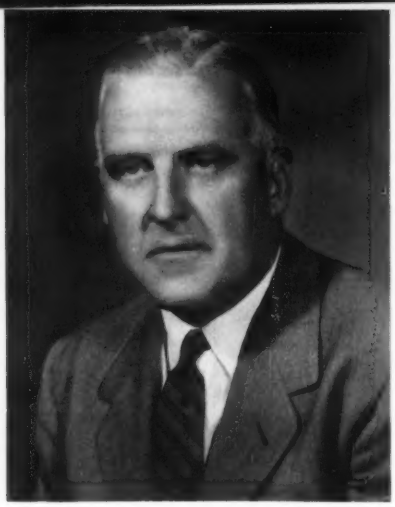
SIMPLE, FAST START-UP

Starting takes less than 20 minutes. Starting sequence is initiated by a single control switch in the supervisory control panel.

MINIMUM PERSONNEL

Due to their extreme simplicity, compact arrangement and easy-to-use controls, and auxiliaries, General Electric gas turbines require a minimum of personnel. Easily adapted features also permit automatic starting and remote operation. When installed at existing steam plants, additional labor is usually not required.

GENERAL ELECTRIC



A Statement by **W. S. Ginn**
Vice President and General Manager
Turbine Division,
General Electric Company

Gas Turbines Hold Greatest Promise of Meeting Extensive Utility Peaking Needs of the Future

After extensive study the General Electric Company has concluded that low-investment gas turbines provide the greatest promise of answering electric utility peaking requirements of the future.

Rapid Peak Load Growth in recent years has focused new interest on the costs incurred for providing added peak load capacity.

Historically, expansion of system capacity has been accomplished by adding large steam turbine power plants to serve the base load portion of the system and operating older power plants at progressively lower load factors until they are retired. However, today on many electric utility systems much of the generating capacity is provided by steam turbine power plants nearly as efficient as the latest equipment.

A continuation of this trend means that today's more costly high-pressure reheat steam plants will become tomorrow's peaking units. Gas turbines, offering appreciably lower initial cost than comparable steam turbine stations provide the economical solution to this basic change in peak load generation economics.

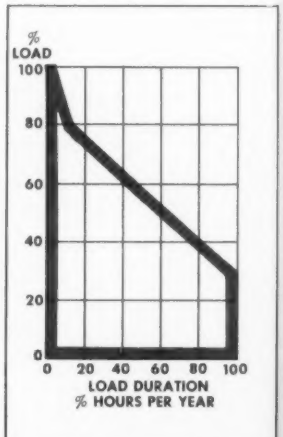
Briefly, Here's Why. General Electric gas turbines offer high capacity from one self-contained unit. In sharp contrast to small building block units, General Electric offers a gas turbine producing 20,000-25,000 kilowatts. Capacity growth potential for the future is inherent in their design.

Lower initial investment results from low space requirements, small foundations, simple building requirements, low cooling-water requirements, and basic design simplicity.

Lower total operating costs result from lower initial investment, reduced maintenance, low standby cost, negligible lubrication oil requirements, and the minimized operating labor costs inherent in automatic or remote operation.

Gas turbines are ready—now—to fill your growing peaking requirements. With 189 General Electric units now in service logging a total of nearly 3,000,000 operating hours, these proved prime movers stand ready to assume their rightful role in helping meet tomorrow's growing peaking power demands—economically.

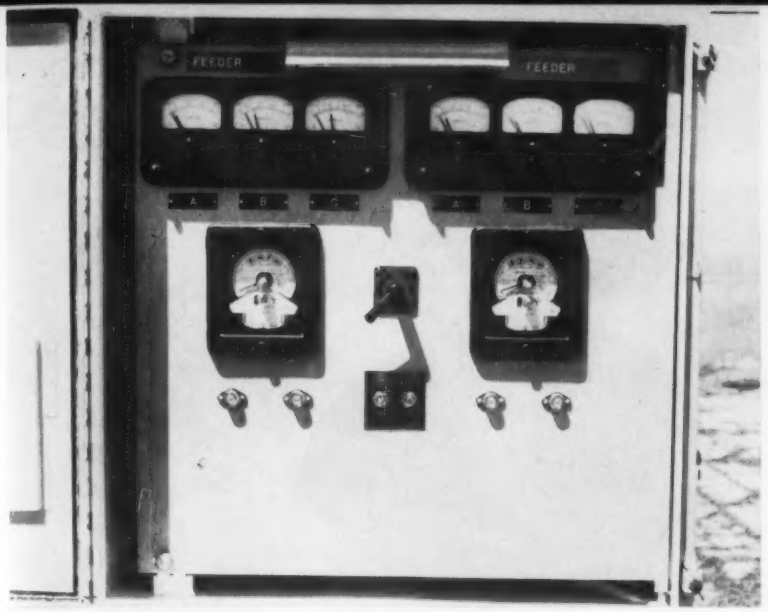
For More Information, contact your nearest G-E Apparatus Sales Office or write Section 261-34, General Electric, Schenectady 5, New York.



WITH THE TOP TEN PER CENT of system load having a duration of only a few hundred hours annually, gas turbines offering lower initial investment costs are General Electric's answer to peaking power requirements of the future.

Progress Is Our Most Important Product

GENERAL ELECTRIC



METERING as well as transfer control for manual switching are on the control panels, such as this, which were installed at the two unattended substations

(*Continued from page* 62)

station, each bank normally supplying power to a main feeder protected by a 3-phase recloser.

Each station has an arrangement of reclosers to provide automatic load transfer in event of primary voltage loss, single phasing due to blown transformer fuses, or any other emergency condition that produces abnormally low transformer secondary voltage. The reclosers, rated 400 amp, are adjusted for one instantaneous, 2-cycle clearing operation and three delayed operations to coordinate with branch line protective equipment. They are equipped with remote control accessories for lockout or closing.

The 3-phase, 400-amp, remotely controlled oil switches serve as bus-tie switches. They the capable of switching inductive loads up to 400 amps. Although not functioning as interrupting devices, they can close on or sustain a 20,000-amp fault momentarily.

Functioning of the transfer control and protective equipment follows normal practice for duplex stations. The control does the voltage sensing and actuates the equipment. It incorporates a time-delay feature to permit recloser response to a permanent fault. Thus, it cannot misinterpret a low-voltage condition, caused by a heavy fault, as a call for load transfer. It blocks automatic transfer after lockout.

The control may incorporate overcurrent relays to distinguish immediately a low voltage fault condition from a primary voltage loss or single phasing. This latter feature is not included at Springfield, but it can be installed readily.

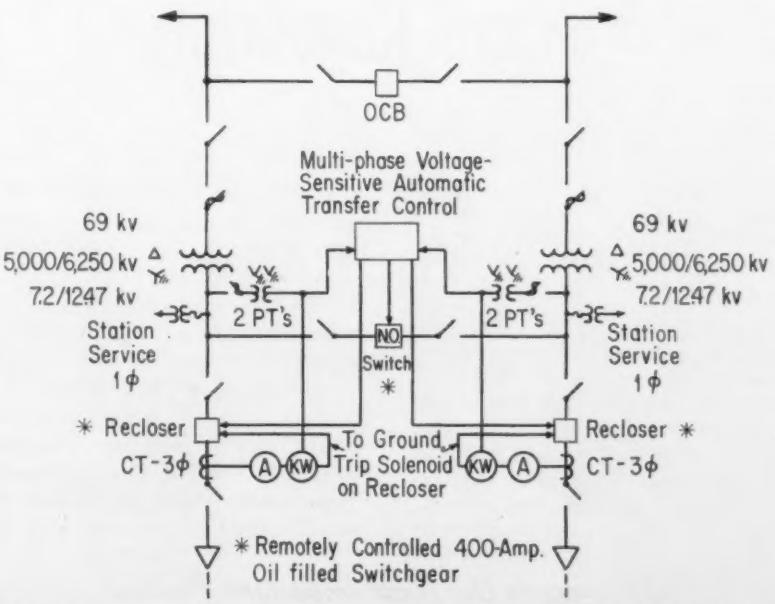
In response to either primary single phasing or complete loss of voltage, the control acts after the time delay to trip the recloser on the affected feeder. As soon as the recloser has opened, energy stored in its remote control spring mechanism closes the tie switch. Total transfer times of 7 to 8 cycles, plus time delay, have been recorded.

Restoration of voltage on the 12.47-kv transformer terminals produces the reverse switching operation after the pre-set time delay. The control actuates tie switch opening before closing of the feeder recloser because paralleling the feeders would not always be feasible. Closing of the feeder recloser is accomplished by phase-to-phase voltage on the source bushings and is controlled by an anti-pump circuit in the relay panel to permit automatic closing only when preceded by a tripout on automatic or manual transfer.

The tie switch can be closed manually, paralleling the feeders. Either recloser can then be opened manually or electrically for maintenance purposes, eliminating the need for manual by-pass switches.

The control cabinets in the two unattended stations house the ampere-demand, kwhr, and kw demand metering instruments for the feeder. One attended station has control equipment in the operator's switchboard.

A 3-phase, wound-primary type current transformer on the recloser frame supplies current for metering and for the ground-trip relaying accessory in the recloser.



PLAN shows the split-bus, duplex substation arrangement with automatic transfer equipment employed for three substations. The units are also expendable

THE MAN WHO HAS TO KNOW . . .
W. E. DUGDALE, PURCHASING AGENT
TELLS WHY . . .

SERVICE pays dividends for Upper Peninsula Power's investment in General Electric Voltage Regulators

"Overnight delivery of a General Electric ML-32 Voltage Regulator from the Chicago warehouse cut outages to a minimum recently after a 3-phase line fault. Consistently prompt G-E service helps us give reliable power to our customers."

General Electric service means the widest and most experienced network of service shops and application engineers available to utilities. G-E service means quick regulator delivery from local warehouses, and rapid repair at local service points—ready for any regulator emergency, seven days a week. And service means complete regulator engineering assistance before, during, and after the order.

G-E REGULATORS COST LESS ON THE LINE because you get continuing extra dividends . . . from **G-E SERVICE**—routine or emergency; from **G-E RESEARCH**—superior regulating equipment; from **G-E DEPENDABILITY**—absolute minimum maintenance. Result: Extra Values—**EXTRA PROFIT.**

Only General Electric returns so much for your regulator investment. Ask your General Electric Regulator Representative to show you how. General Electric Co., Schenectady 5, N. Y.

423-36

Progress Is Our Most Important Product

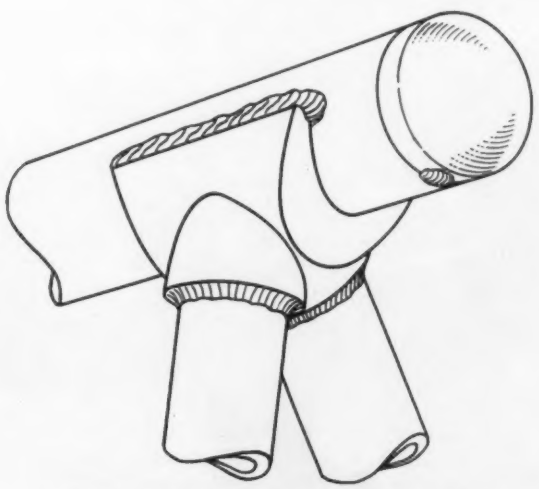
GENERAL ELECTRIC

Welding Installation Data for Switchyard Bus*

Data are provided on welding aluminum tubes and fittings for installation of switchyard bus; compiled by a Southwestern utility†

Welding Operations for Switchyard Bus

Description	Number of Welds	Linear In. per Weld	Total Linear Inches
BUS CONNECTIONS			
T-Weld for 5 in. OD, ⅜ in. wall, tube run to 1½ in. SPS tube tap	66	6.08	401.28
Angle T-Connectors for 3½ in. SPS tube run to 2–1½ in. SPS tube branch 2–1½ in. branch	66	6.08	401.28
Angle T-Connector for 3½ in. SPS tube run to 2–1½ in. SPS tube branch 3½ in. run	33	15.78	520.78
Expansion Connectors for 5 in. OD, ⅜ in. wall tube	24	15.70	376.80
Expansion Connectors for 5 in. OD, ⅜ in. wall tube with 3½ in. SPS tube aligning sleeve	6	13.35	80.10
Butt Welds for 5 in. OD, ⅜ in. wall tube with 3½ in. SPS tube aligning sleeve	15	15.70	235.50
Corona Bells for 5 in. OD, ⅜ in. wall tube	12	15.70	188.40
Corona Bells for 3 in. SPS tube	3	10.99	32.97
Corona Bells for 3½ in. SPS tube	18	12.56	225.08
Corona Bells for 3½ in. EHPS tube	9	12.56	113.04
T-Connector for 3 in. SPS tube run to 2–1,590 Mcm AA cable connectors tap	3	12.00	36.00
T-Connector for 3 in. SPS tube run to 2–954 Mcm AA cable connector tap	3	12.00	36.00
T-Connector for 3 in. SPS tube run to 800 Mcm AA cable connector tap	12	12.00	144.00
AUTOTRANSFORMER STRUCTURE			
T-Connector 3½ in. SPS tube run to 2–600 Mcm bare copper cable connectors tap	3	12.78	38.34
Totals	273		2,829.57



Welded Angle T-Connector (Item 2 in table)

*Brenner, Morris, Vice President-Engineering, Penn Union Electric Co, Erie, Pa.
†Welding data for generator leads were published in Electrical World, April 20, 1959, p102, and similar data from a midwestern utility will be published in a subsequent issue.

FOR
LOCALIZED SERVICE
ON POLE LINE HARDWARE

SPECIFY **CHANCE**

Here is the Chance New York ServiCenter, one of ten located from coast to coast.

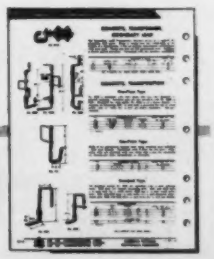
Thousands of items like these are available for fast delivery.

Advanced designs in pole line hardware, like the single bolt 808 Guy Guard . . . the new mechanically-wedged fiber-glass strain insulator . . . and brand new ideas in brackets and wireholders, as well as standard pole line hardware, are carried in Chance ServiCenter stocks.

Strategically located Chance *ServiCenters* put stocks and service within easy reach

From anchor to pole top—Chance makes everything you need in guying materials and pole line hardware. Now, ten new ServiCenters put these Chance products within one-day shipping distance of the great majority of Chance customers and distributors. Contact the Chance ServiCenter in your area for prompt quotations, product information, technical assistance and fast delivery.

The easy way to find pole line hardware information in a hurry . . . Check your Chance "dictionary style" Catalog Pages.



ABC for INDUSTRIES

A. B. CHANCE COMPANY

CENTRALIA, MISSOURI

A. B. Chance Co. of Canada, Ltd., Toronto

CP59-9

Procurement & Products

PRICES ▶ **Mandatory oil quotas haven't boosted coal prices** to Atlantic Coast utilities. Contracts effective April 1 were down 25¢ a ton in New England and Middle Atlantic States where oil has competed most strongly, and on into Ohio and Michigan. Prices to the south are described as "very soft." Rail rate cuts of 50¢ a ton (incremental) are due May 15 in areas from Baltimore to New York. Only stiffening is in the oil-less East North Central Region: Contracts there are up 15¢ a ton this year, following a 5¢ rise as of April 1.

METALS ▶ **Aluminum production shifts to meet markets.** Kaiser is bringing in new potline in Ravenswood, W. Va., about May 1. At the same time, it will be cutting back production in Washington state.

ORDERS ▶ **New York Power Authority turns to Italian firm** for large structural steel order. The winning bid, submitted by a Milan supplier was $264,700 for 900 tons of structural. Closest domestic bidder was more than $100,000 above the Italian bid.

STORES ▶ **Stores department for a Southwest utility is saving $50,000** a year in clerical costs by charging out bolts, washers, and miscellaneous hardware for line crews by the package—rather than by individual items. At the end of the year, the charges are prorated to investment or maintenance in proportion to the amount of work done by the crews during the year.

Sales of scrap and surplus nets nearly $185,000 during 1958 for Jersey Central Power & Light and New Jersey Power & Light. Scrap copper was largest income producer, accounting for $145,000 of the total. However, revenue on scrap in 1958 was slightly below 1957 because of declining market conditions.

PRODUCTS ▶ **First aluminum transmission prototype towers** have been built and passed structural tests. First shipments to a utility customer are now tentatively scheduled for July of this year.

Rechargeable flashlight batteries will soon be offered for sale to electric utilities. Sonotone Corp is the maker. The batteries, consisting of two nickel cadmium cells in a single case, will be fitted with male plug for insertion into any ac outlet.

WHAT'S AHEAD ▶ **Complete redesign of motor line**—including motors used for power station auxiliaries—will be announced later this month by a larger manufacturer.

News of manufacturers ..... page 76
New Equipment ..... page 82
Readers Service ..... page 90

UTILITIES . . .

Let us help you get YOUR share of the $540,000,000.00 Street Lighting Revenue!

Today, actually only a little more than 7% of our street and highway lighting meets the standards of minimum illumination. Here is an opportunity for our nation's utilities to increase their revenue as well as make the cities and towns which they serve safer places in which to live and work. You, as an engineer, can help reduce night auto accidents, cut pedestrian traffic fatalities, spur business activity during evening hours, *boost community pride*—and all for a relatively small cost to the taxpayer.

We at Kerrigan will be glad to help in promoting your relighting programs. We will furnish you with our brand new catalogs containing engineering data and installation photographs. Illustrated are many types of steel and aluminum lighting and traffic signal standards, mast arms and brackets, etc. (including our new Classic design that complements the new streets and highways). Samples of our products and success stories of city and town relighting programs are also available. Just write us a letter and this material will be sent without delay.

Address Dept. EL.

FOR BETTER LIGHTED STREETS AND HIGHWAYS THE *STANDARD* IS KERRIGAN

KERRIGAN IRON WORKS, INC.

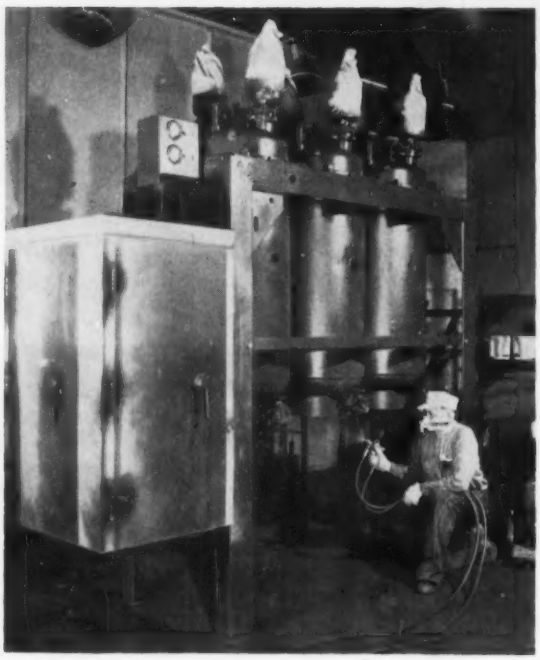
Nashville, Tennessee

GE Expects Acrylic Paint to Cut Maintenance Costs

Maintenance costs for outdoor power equipment are expected to be reduced by using acrylic resin paint. Recent tests in Florida proved the paint, now being introduced by General Electric, provides a durable long-lasting finish.

The tests, said GE, found acrylic paint has far greater resistance to acid and alkali impurities in the air than present paints used by the company. This durability factor is of particular importance in industrial and coastal areas.

The life of acrylic paint "will be more than double that of paints previously used," said GE. The company's High Voltage Switchgear Dept has already applied the paint to outdoor breakers destined for southern utilities. A production line for using the paint will be completed by June 1.



Uptegraff's 10-Mva Units Shipped Ready for Service

Four of these 10,000-kva power transformers were shipped recently to the City of Detroit completely assembled and ready for service on arrival. This was made possible by mechanical modifications in design and improvements in materials, R. E. Uptegraff Mfg Co reported.

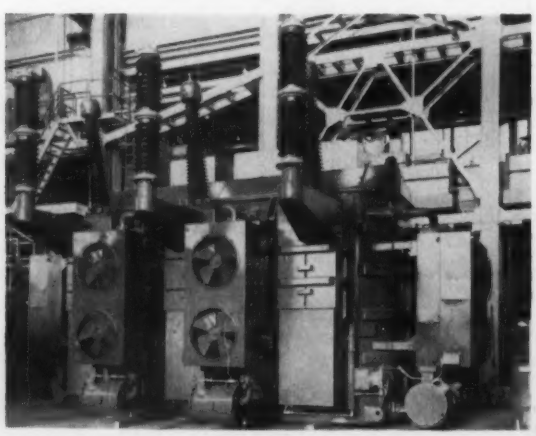
The four units, designed to operate at 25 kv, will provide power for water pumping stations.

Moloney Electric Builds 217-Mva Transformer

With the continued move to higher voltages and ratings, Moloney Electric extends its experience in power transformers by completing this 217,000-kva unit. It was shipped recently to Potomac Electric Power's Dickerson (Md.) Station.

The highest rated transformer Moloney has built, this unit is 3-phase, type FOA, with high-voltage rating of 234 Grd Y/135 kv and low-voltage rating of 13.5 kv.

(*More Manufacturers News, p* 78)



VICTOR suspensions

make dollars and sense

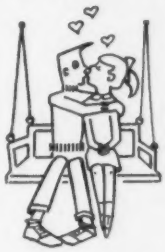
WHY SPECIFY VICTOR?

When you're buying insulators for your lines, don't go about it blindly. Buy the Suspension with an enviable reputation for performance . . . made by a company that's famous for service at the factory and in the field. VICTOR Suspension Insulators are used by many of the nation's foremost utilities on HV and EHV lines. And why not? They are premium products, yet they cost no more than others. Remember—insulators have been made at VICTOR since 1893. To VICTOR, insulator-making is a science. Scientific methods together with meticulous attention to detail have made VICTOR insulators the finest that are available. Put up VICTOR Suspensions today and the chances are you won't ever replace them . . . they will last that long! It's smart buying to buy VICTOR. Makes dollars for you . . . and sense, too.

AIR-CONDITIONED COMFORT

Yes, sir, VICTOR insulators are treated better than most people! We even give them temperature - humidity controlled atmosphere to breathe while the cement that holds cap, shell and pin together, sets and hardens. Reason for such pampering is to prevent cemented assemblies from losing moisture too rapidly . . . permitting them to set properly and attain greatest bonding strength. It's a small detail in the entire VICTOR manufacturing procedure. But, a lot of small details like this result in better Suspensions . . . VICTOR Suspensions.

MAKING SURE A HOT LINE WON'T GET COLD



The *Purified* Porcelain VICTOR uses in all its suspension insulators is your best assurance against the hazards of weather. This finest insulator porcelain ever made has unequalled ability to withstand stress and strains due to ice, snow and high winds. They endure thermal variations way above EEI-NEMA standards. They make dollars and sense for any power man.

WE SOCK 'EM WITH A HAMMER!

If there were a Society for the Prevention of Cruelty to Insulators, we'd be in trouble most of the time! There's no arguing the fact . . . we treat 'em rough when it comes to testing them for impact. In our test laboratories, our quality control procedure subjects VICTOR Suspensions to impact steps far in excess of EEI-NEMA standards by means of a hammer of known weight falling at predetermined heights and striking the outer edge of the insulator shell. These rather drastic tests do destroy quite a few insulators. That's bad! But they do make sure that the VICTOR Suspensions you get have greater resistance to impact than any other suspension insulators you can buy. That's good!

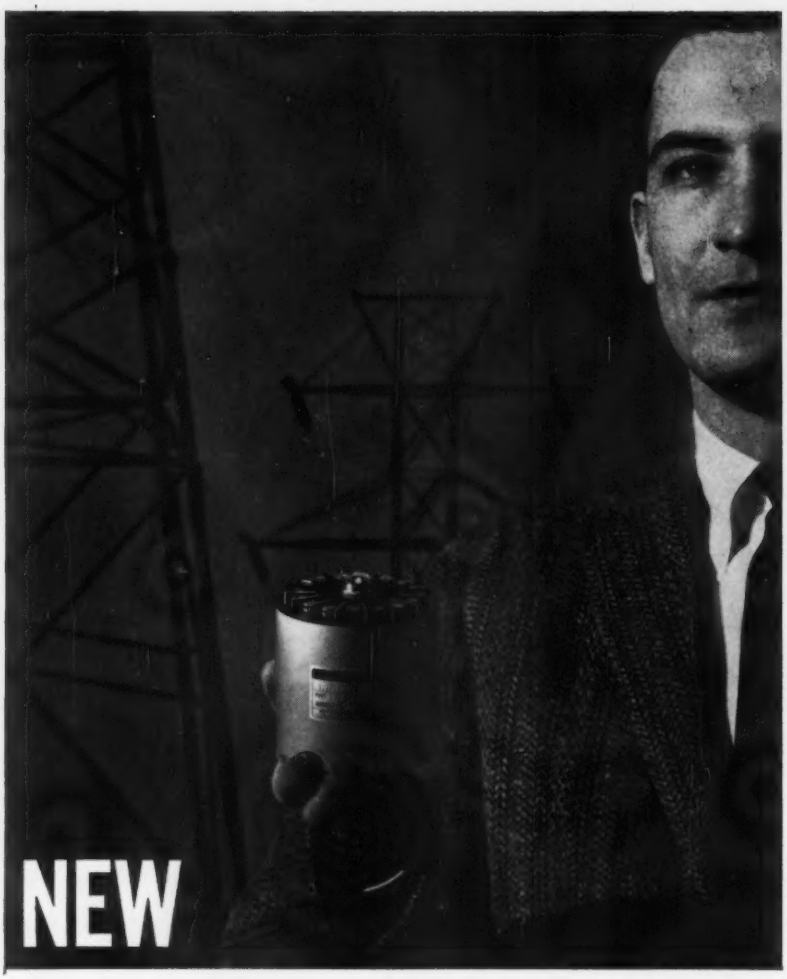
DO YOU KNOW THAT . . .

- VICTOR's plant began producing wet process porcelain in 1893?
- VICTOR's Craftsmen have a total of more years of insulator-making experience than those of any other plant in the industry?
- VICTOR was the first to use demineralized water for all processing?
- VICTOR pioneered the use of infrared drying of insulators?
- VICTOR was among the first to use silicon carbide kiln furniture?
- VICTOR pioneered the use of modern tunnel kilns equipped for recirculation of kiln gases?
- VICTOR was the first to use American clays exclusively?

For full information on VICTOR Suspension Insulators, write I-T-E Circuit Breaker Company, Victor Insulators Division, Victor, N.Y.

VICTOR NO. 900
Suspension Insulator

I-T-E CIRCUIT BREAKER COMPANY
VICTOR INSULATORS DIVISION



Westinghouse TELEDUCTOR Magnetic Amplifier

more protection, savings, accuracy in measuring a-c voltages and current converts instrument transformer output to d-c milliamperes

In the telemetering of high-voltage feeder circuits or transmission lines, new Westinghouse teleductors offer many new advantages which have been previously unobtainable.

GREATER SAFETY . . . teleductor secondary may be open-circuited in current or voltage circuits without hazard to personnel and equipment

ECONOMICAL . . . costs less than conventional systems which use multiple meters or interposing relays

LONGER LIFE, LESS MAINTENANCE . . . completely static . . . no moving parts to wear or fail

EASILY INSTALLED . . . compact . . . can be mounted in any position

ACCURATE . . . linear output with both voltage and current input

GET ALL THE FACTS about the many ways new Westinghouse teleductors can put more savings and reliability in your telemetering operations. Contact your Westinghouse sales engineer. Or, write to Westinghouse Electric Corporation, Director Systems Department, 356 Collins Avenue, Pittsburgh 6, Pennsylvania. J-01013

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

Desk-top Analog Computer Tailored for Engineer's Use

A low-cost analog computer "capable of performing 95% of the routine mathematical operations encountered by an engineer in normal design calculations" was unveiled recently by Electronic Associates, Long Branch, N. J. The company suggested that the computer would have wide applications in thermodynamics, circuits, and transient performance of electrical machinery.

The all-transistorized computer, known as the Pace TR-10, occupies slightly more desk-top area than a typewriter. It is 15 in. wide, 17 in. deep and 24 in. high, and weighs 80 lb without accessories.

The computer is priced, said Electronics Associates, to place analog computation at every engineer's fingertips and permit him to obtain first-look solutions in a fraction of the normal time required. By applying analog computation to everyday problems, the company said, the individual engineer can eliminate most multiple calculations, thereby enlarging his output many times.

Price of the computer starts slightly below $4,000. Read-out equipment, such as plotters and recorders, ranges from $1,350 to $1,900. The type of accessory needed depends on whether the user wants his problem solution presented numerically or graphically.

A transistorized dc amplifier developed by the company is credited with making possible the compact size of the computer. Two amplifiers, packaged as a single shielded unit, occupy only 1½ x 5 x 6½ in.

(*More Manufacturers News, p* 80)

NOMINAL WEIGHTS OF FINISHED WEATHER-RESISTANT WIRE AND CABLE

(Pounds per 1000 Feet)

Conductor Size AWG or Mcm	Copper & Copper Alloy Conductors: URC Type Double Braid	URC Type Triple Braid	Neoprene Type	**Polyethylene Type**	Aluminum Conductors: Neoprene Type	**Polyethylene Type**
Stranded						
2	246	270	248	**230**	105	**87.4**
4	155	170	163	**143**	73.3	**53.3**
6	103	115	108	**91.5**	51.5	**35.0**
Solid						
2	239	260	232	**219**	92.2	**79.2**
4	151	164	152	**136**	64.0	**48.0**
6	100	112	101	**87**	45.7	**31.7**

Sources: American Standards Association Specifications

This table shows

POLYETHYLENE covered line wire weighs less

Because it's the lightest, polyethylene-covered line wire is the easiest for linemen to string up . . . hardest for ice and snow loading, gale-force winds to bring down.

Polyethylene-covered line wire, depending on size and conductor, weighs from 5% to 32% less than other types. That's what the figures in the specifications tabulated above show.

This, of course, is no news to linemen who have strung all types of weatherproof line wire. They may not be able to quote pounds and percentages, but they all know you can't beat polyethylene on weight.

Linemen's Favorite Material

Light weight means easy handling, one of the main reasons polyethylene rates tops with installation crews. They also like polyethylene wire because it's clean . . . free-stripping . . . has a smooth, self-lubricating surface that almost makes pulling a pleasure. And despite the exterior slip, the plastic covering hugs the conductor tightly, doesn't ruffle as it goes over crossarms.

"Built-in" Safety Factor

Polyethylene's lightness provides lasting mechanical advantages, since span loads don't tax supports as much as heavier type wire. This "built-in" weight safety factor pays off when violent storms push aerial construction to strain limits . . . when ice and snow loads topple heavier lines.

An added factor in polyethylene wire's ability to stay up under adverse conditions is its smaller diameter. It offers less resistance to wind, a smaller surface for ice build-up.

Winning Combination

Called the "closest to the ideal covering for line wire," polyethylene is outstanding in other respects too. The shield it forms over wire is continuous . . . tough . . . resistant to aging, weathering, moisture, abrasion by lashing branches. It's good for decades of superior service marked by fewer outages, minimum maintenance.

When you order covered wire and cable, make sure the coating is made with PETROTHENE® polyethylene resins. PETROTHENE polyethylene costs no more, but it gives you premium weather and stress-crack resistance.

Polyethylene's advantages are outlined in an informative new U.S.I. data sheet, "Polyethylene . . . The Best Line Wire Covering." Also available is a data sheet showing properties, applications and specifications of PETROTHENE polyethylene compounds. Send for your copies today.

U. S. Industrial Chemicals Co.
Division of National Distillers and Chemical Corp.
99 Park Ave., New York 16, N. Y.

Please send me:
☐ "Polyethylene . . . The Best Line Wire Covering"
☐ "PETROTHENE Resins for the Wire and Cable Industry"

Name:_____ Title:_____

Company:_____

Address:_____

City:_____ State:_____

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corp.
99 Park Ave., New York, 16, N. Y.
Branches in principal cities

LABORATORY CONTROLLED...

Crapo

GALVANIZED STEEL STRAND FOR GUY, MESSENGER and OVERHEAD GROUND WIRE

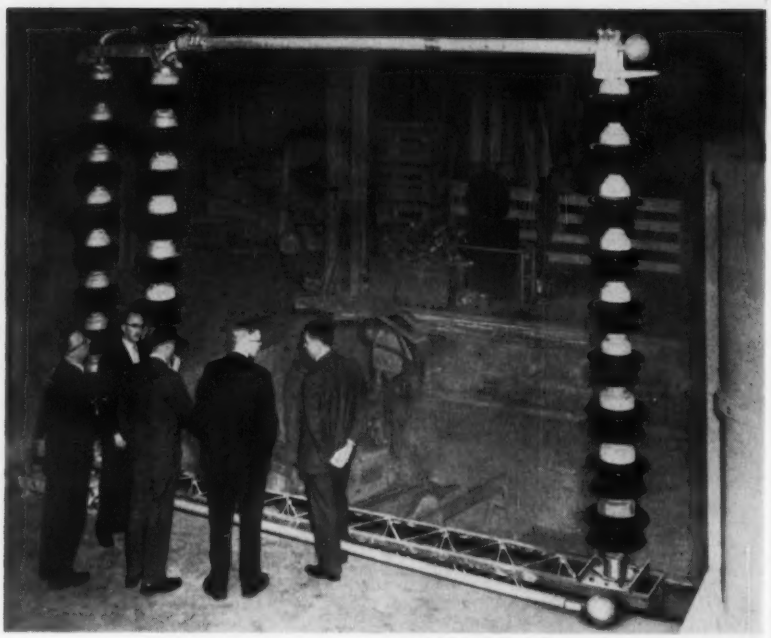
The high, uniform, consistently-dependable quality of Crapo Galvanized Steel Strand is the direct result of close laboratory control over each step in manufacture. All wires used in forming a particular size and grade are produced from steel of selected analysis, carefully processed under technical supervision and stranded on precision machines. Both wire and finished strand are subjected to prescribed laboratory tests to insure the desired end result.

Heavy, uniform, tightly-bonded zinc coatings, applied by the famous Crapo Galvanizing Process, provide maximum resistance to corrosion.

Write for booklet OG-25 containing "Sag and Tension Data for Overhead Ground Wire."

INDIANA

STEEL & WIRE CO., INC., Muncie, Indiana



Disconnecting Switch Built for 345-Kv

Eastern Power Devices, Ltd., Port Credit, Ont., has developed for Aluminum Co of Canada a 345-kv, 1570-BIL, 2000-amp disconnecting switch. Installed in the Chute des Passes project, it is shown here being inspected by a group of utility engineers.

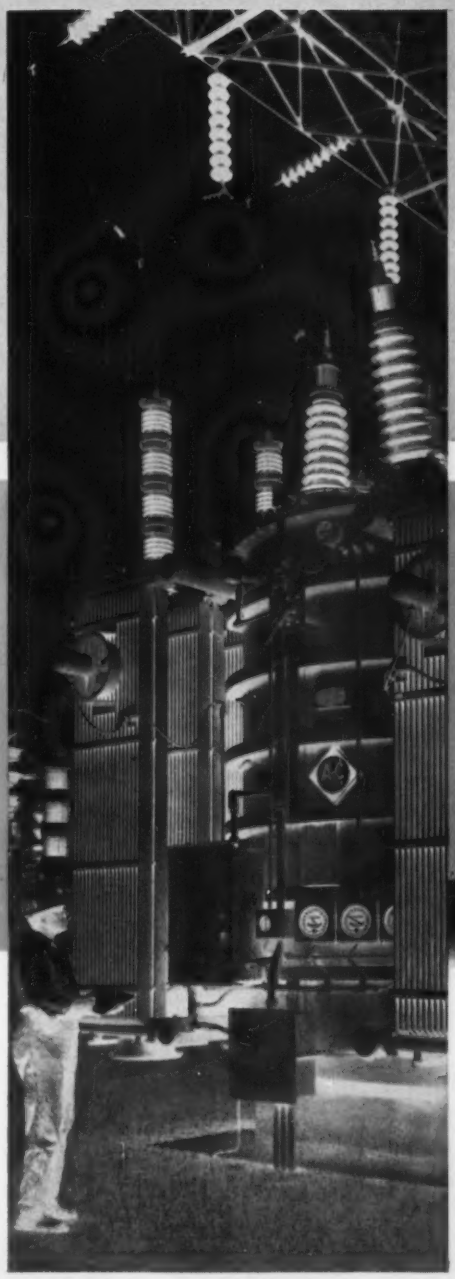
The manufacturer believes the switch is the largest made to date on the North American continent. It has a maximum rating of 400 kv, 1800 BIL, measures 20 ft long and 15 ft high. Current carrying parts are made of aluminum.

Initial contract includes seven 3-pole line switches and ten 3-pole transformer switches. Radio interference is reduced to acceptable limits by shielding rings, positioned at each end of the single-pole switches.

MANUFACTURERS BRIEFS

Multi-Amp Corp appoints **Line Material Industries** as national distributor for the Multi-Amp "Acts" series test instruments for testing oil circuit reclosers . . . **Anaconda Wire & Cable** purchases the stock of Sequoia Wire & Cable, Redwood City, Calif., from Mandrel Industries, Inc, to operate the company as a wholly-owned subsidiary for manufacture of small wires . . . **Federal Pacific Electric's** transfer of all its Pacific Switchgear Div operations from San Francisco locations to enlarged facilities in Santa Clara, Calif., by July will complete a 7-year West Coast consolidation program. Addition of 157,000 sq ft is being made to Santa Clara buildings erected on 22 acres purchased in 1952 . . . Fully staffed, branch offices for **Minneapolis-Honeywell's** Datamatic Div are being established in five U. S. cities, in support of an accelerated sales and service program . . . **Westinghouse** develops a fluorescent lamp which uses an ordinary socket and requires no external ballast or starter. Self-ballasted, the lamp contains a built-in bi-metal starting switch similar to one used in the fluorescent starter. Large external inductor ballast is eliminated by using an incandescent filament . . . **Motorola** is supplying four microwave systems, covering 187 miles to connect 24 Southern California Edison installations. SCE already operates three two-station Motorola microwave systems.

ALLIS-CHALMERS modern line for '59



Extras...Extras...

Read all about them

It's the extras that make the difference in the electrical equipment field today! There's much standardization today, but there's still room for the designer's genius. There's still room for features resulting from research or field experience.

While you're buying — update! And to update — look for the extras. They make the difference.

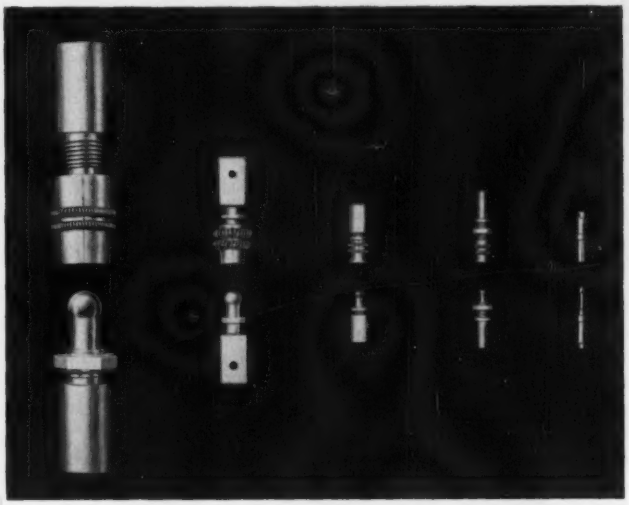
Some of the extras Allis-Chalmers offers are shown on the following pages. Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

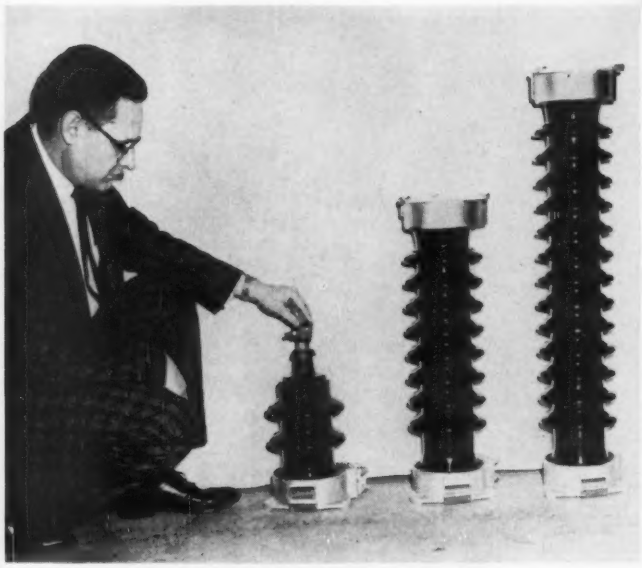
A-5908-E

(For further information refer to Reader Service on Page 90)

Plug-In Connectors . . .



. . . are self-aligning, yet make possible a positive seal of the basic terminal arrangement. Action of the ball contacts in the split, spring-held sleeve is that of a universal joint. Connectors may be used at any location where vibration is a problem.
Cole Electric Co, 8439 Steller Drive, Culver City, Cal.



Lightning Arresters . . .

. . . have low-discharge characteristics, low-impulse sparkover, and high-surge capacity in excess of 100,000 amp. The Type IVS arresters are available in sizes from three to 121 kv and meet ASA, AIEE and NEMA standards. A new porcelain housing, containing a high-strength glaze, provides greater cantilever strength.
Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

Bullwheel Tensioner . . .

. . . is supported by a power pole in the line. Designated as Catalog No. 4000 PM, the unit weighs only 165 lb and is entirely portable. It may be hauled on any truck to the job site, lifted off by two men and quickly attached to a pole. Any conductor up to 4/0 may be strung with the Pengo 4000 Pole Mount Tensioner.
Petersen Engineering Co, Inc, Santa Clara, Cal.

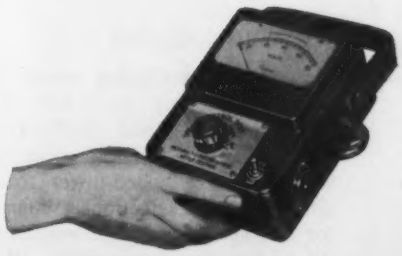
(*More New Equipment on page* 84)

ALLIS-CHALMERS modern line for '59

. . . simpler regulator control

- **Provides more accurate settings**
- **Saves operator's time**
- **Eliminates customer complaints**

Now when you adjust or test voltage level and band width there's no need to change customer voltage. No more customer complaints of high or low voltage. With *Caliband* control the job is simpler than ever before. Adjusting a single knob is all it takes . . . operator's time for accurate settings is greatly reduced.



CALIBAND control demonstrated

Caliband control is so simple it can be demonstrated and explained at your desk with an actual unit in a small portable kit. Contact your nearby A-C office for a demonstration, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS
Originators of 5/8% Step Regulators
A-5912

Caliband is an Allis-Chalmers trademark.

NEW!

3 in 1
Superior Cable

. . . components for

- **CONTROL**
- **COMMUNICATION**
- **INSTRUMENTATION**

all under one sheath!

Here's a new Superior Composite Cable that solves many power, electronic and communication problems. One cable does the work of three or four!

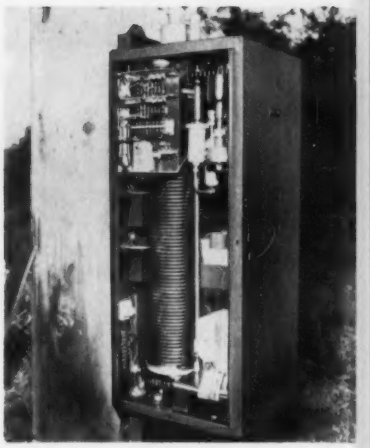
Control circuits can consist of any number of individual conductors, pairs or groups under the unit jacket. Communication circuits of a critical nature requiring special shielding may be combined with pairs, triples or quads of standard construction. In addition, instrumentation and/or low voltage power circuits can also be included in the basic construction.

Like all plastic insulated and sheathed Superior Wires and Cables, these new composite cables are quality-engineered and manufactured to deliver maximum efficiency at minimum cost.

Write for detailed information to

SUPERIOR CABLE
SUPERIOR CABLE CORPORATION
Hickory, North Carolina

3602



Switch Operator . . .

. . . with motor-spring mechanism is now available. It makes possible electrical (remote and local) or manual operation of 3-phase sectionalizing switches with ratings of 400 and 600 amp at voltages of 7.5 through 69 kv. An external source of 115 v ac is required for the mechanism motor, while the mechanism has a self-contained dc power supply for the release linkage that permits emergency operation.
Line Material Industries, McGraw-Edison Co, Milwaukee 1, Wis.

Silicone Grease . . .

. . . maintains its consistency from −75F to +300F. Designated as SS-4007, the compound is designed as a rust inhibitor and lubricant for mated, threaded or non-threaded ferrous components and fabricated rubber parts. It may be applied by spraying, wiping, brushing or aerosol spraying.
General Electric Co, Silicone Products Dept, Waterford, N. Y.

Hydraulic Digger . . .

. . . has three digging speeds and auger torque up to 8,400 ft-lb. Labeled the Series 5400 Earth Borer, the unit has low speed-high torque, higher speed-lower torque and spin-speed selections. When set for low speed and high torque, the digger handles augers up to 30 in.
(*Continued on page* 86)

ALLIS-CHALMERS modern line for '59

Easy to install... even easier to maintain

Install in minutes — Thru-type design eliminates bolted primary connections. Mount it in any position. No hangers or enclosing boxes are required. Large oval window holds two 750 MCM insulated cables.

No maintenance needed — Molded of epoxy-resin, this transformer never needs painting. It has excellent dielectric properties and can withstand wide temperature variations and severe mechanical shocks.

Get the complete story from your A-C man or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Plan to stay ahead... MODERNIZE!

A-C ALLIS-CHALMERS

A-5945-E

PAGE

FENCE

Fence value depends on
—quality materials
—quality installation
You get both from PAGE

New Aluminized Fabric!
(other quality fabrics available:
galvanized steel,
aluminum,
stainless steel)

8 basic fence designs
6 gate styles

Expert installation
by specialists

Registered Certificate
of Quality furnished
to property owner

Good fences—since 1883

Write for helpful booklet

PAGE FENCE ASSOCIATION
National Headquarters • Monessen, Pa.

A product of Page Steel & Wire Division
American Chain & Cable Company, Inc.

Hydraulic Digger . . .

(*Continued from page* 84)

in diameter in rocky terrain. It accomplishes normal digging at the lower torque-higher speed and handles augers up to 16 in. in diameter. **Holan Corp, 4100 W 150th St, Cleveland 35, Ohio.**

Jumper Clamp . . .

. . . has extra-wide range to accommodate conductors from No. 6 solid through 1,192.5 MCM ACSR or 1,300 MCM copper. Current rating is 400 amp continuous. An external T-bolt terminal takes jumper cable up to 4/0, 15 kv. The 4-lb, 26½-in. tool has an aluminum alloy head, and a 14-in. fiberglass handle. **James R. Kearney Corp, 4236 Clayton Ave, St. Louis 10, Mo.**

Control . . .

. . . for capacitor switching contains improved master induction disk relay with a dual adjustment range—

(*Continued on page* 88)

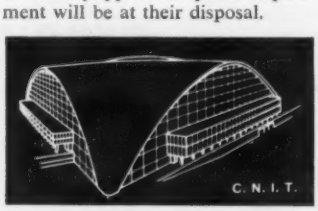
PARIS
Electrama
JUNE 12th to 28th, 1959

FIRST GENERAL EXHIBITION OF THE FRENCH ELECTRICAL ENGINEERING INDUSTRIES AND OF THE APPLICATIONS OF ELECTRICITY IN MODERN LIFE

Electrama, spectacular display of the most up-to-date electrical, electro-mechanical, nuclear equipment, etc.... as well as their utilizations by public services and big industries.

Electrama world meeting of the people that count in the industrial, administrative and scientific fields, will take place *during the Paris season from June 12th to 28th, 1959,* in the most modern Exhibition Palace: The "Centre National des Industries et des Techniques" (C.N.I.T.).

Electrama offers its assistance in connection with the visit of its foreign guests to France (hotels, visits of plants and big industrial installations in France, meetings with French personalities and technicians, etc....). Multi-lingual personnel and a well-equipped reception department will be at their disposal.



*25% reduction on French Railways and most foreign railway systems.

For information apply to the Commissariat General,
14, Rue de Magdebourg, Paris 16e ..

Electrama will take place at the same time as the Air Show which will include an important participation of the Electronics Industry and the Chemistry Exhibition in Paris.

ALLIS-CHALMERS modern line for '59

Low cost, high speed 4.16-kv oilless units replace obsolete under-capacity breakers

Eliminate a fire hazard, reduce maintenance, provide modern high speed interruption, plus adequate interrupting and continuous-current capacity with Allis-Chalmers replacement breakers.

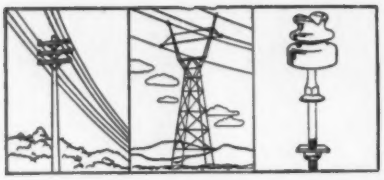
Existing cables and structures can be used with these replacement breakers. Low cost modernization can thus be provided in power-generating and substation facilities. The air magnetic breaker, together with its sturdy metal enclosure, can be installed in the masonry cell or open-type iron pipe framework previously occupied by the obsolete oil circuit breaker. Buswork, disconnect switches, current transformers, and cables can all be retained because of low height.

Modern features of breaker include: 5-cycle interruption, flame-retardent insulation, safety interlocks, full steel floor in breaker compartment, automatic shutters, one man disassembly. Interrupting capacities from 75,000 to 250,000 kva available.

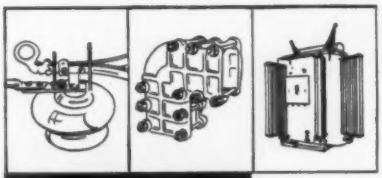
For details contact your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-C ALLIS-CHALMERS

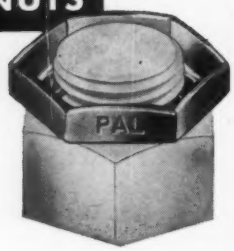
A-5977-E



Keep Nuts Tight
on all bolted assemblies



Apply
PALNUT
LOCK NUTS



PALNUT Lock Nuts apply so fast, lock so dependably . . . you can specify them for every nut-and-bolt assembly, at negligible cost. Maintenance is reduced on mechanical assemblies—full conductivity assured on electrical connections.

PALNUT Lock Nuts may be used on new or existing equipment. Easily removed and re-used when servicing. Require only 3 bolt threads. Available in plain, Parkerized and hot dip galvanized steel; also silicon bronze.

Send for free samples, stating size and application

THE PALNUT COMPANY

51 Glen Road
Mountainside, N. J.

PALNUT
TRADE MARK
LOCK NUTS
for quick, secure fastening at low cost

Control . . .

(*Continued from page* 86)

from ½ to 1 amp and from 1 to 4 amp. In addition, a var relay is used for the first time. Two thermal plug-in type fixed time-delay relays, one in the close circuit and one in the trip circuit, provide a predetermined time delay that eliminates unwanted switching operations from rapid system fluctuations of short duration.

Westinghouse Electric Corp, Box 2099, Pittsburg 30, Pa.

Carrier Equipment . . .

. . . provides high-speed channels for transformer differential relaying, line transfer-trip relaying and line directional comparison relaying. Known as Type 10 tone, the transistorized frequency shift tone equipment operates from 24, 60 and 120-cell batteries. It may be used over standard leased lines, private telephone lines, or carrier or microwave channels.

General Electric Co, Communication Products Dept, Lynchburg, Va.

How is your PSF . . . Pole Safety Factor? Ground-line treatment with Chapman Pol-Nu, grease-type preservative containing a full 10% Pentachlorophenol, restores the high original preservative protection to this critical pole area, extends pole life as much as 15 years. Treatment is easy with the Pol-Nu Bandage-Maker shown here.

1. As paper is pulled through Bandage-Maker an even, accurately measured coating of Pol-Nu is applied to form a bandage of required length, in the field.

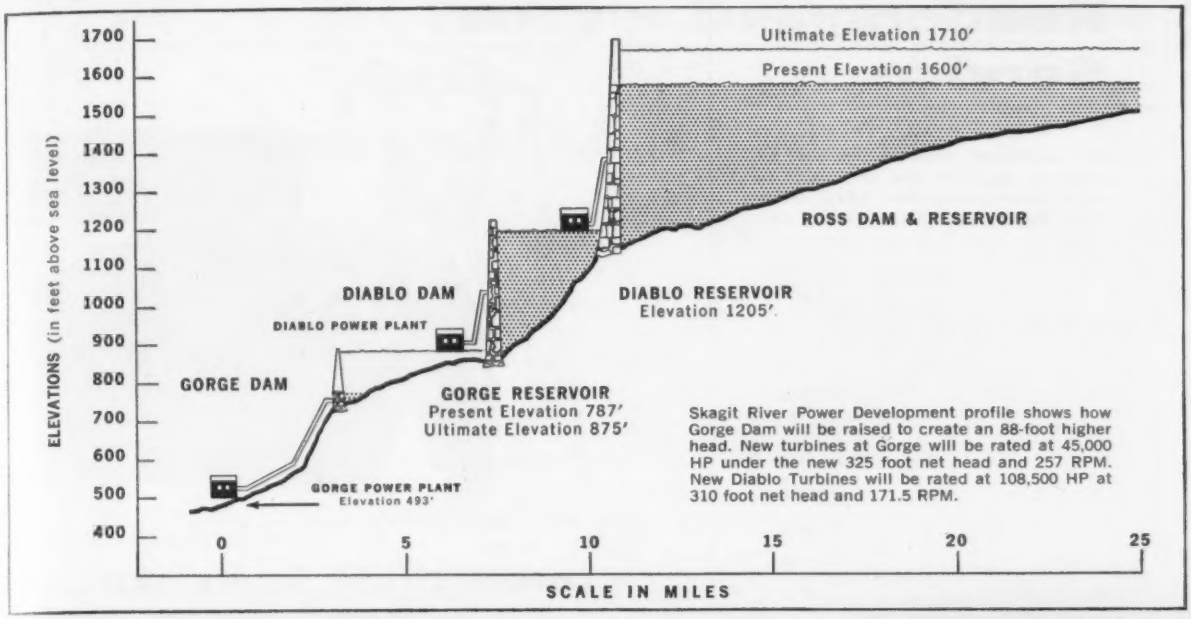
2. Bandage is wrapped around pole, may be applied immediately without waiting for wood to dry. Preservative penetrates readily to provide lasting protection.

Write today for complete details

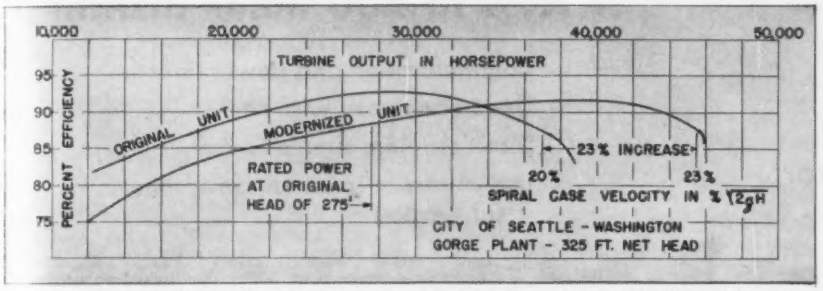
CHAPMAN®

POL-NU
and Pol-Nu Bandage-Maker

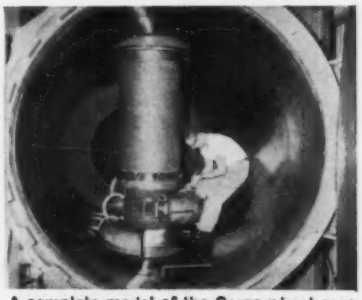
CHAPMAN CHEMICAL COMPANY
Leading manufacturer of wood preservatives
P. O. BOX 138-B, MEMPHIS 1, TENN.
Palo Alto, Cal., Portland, Ore., Minneapolis, Charlotte, N.C.



Skagit River Power Development profile shows how Gorge Dam will be raised to create an 88-foot higher head. New turbines at Gorge will be rated at 45,000 HP under the new 325 foot net head and 257 RPM. New Diablo Turbines will be rated at 108,500 HP at 310 foot net head and 171.5 RPM.



This shows the Laboratory Test performance (power stepped up for head and size), of the existing Gorge runners under the higher head and the new runner and gate design for the same conditions.



A complete model of the Gorge wheel case assembly, built to extreme accuracy, is shown being mounted in the test chamber of the high-head test stand in York, Pa.

CITY OF SEATTLE TO GET MORE POWER

New Turbine Designs in Modernization of Gorge, Diablo Facilities Will Help Increase Capacity 23%

As part of its program to get more power, Seattle, Washington's Skagit River development includes replacement of 35- and 22-year-old turbine runners at the Gorge and Diablo plants, and increasing the height of the Gorge Dam. Rebuilt vertical Francis runners and new wheel case accessories will give each unit 23% more capacity in the existing wheel cases.

Extensive model tests, conducted in the Allis-Chalmers Hydraulic Division laboratory's high-head test stand, proved that the proposed new runner and modified gate designs would provide the increased power with very little loss in efficiency. In addition, they would have improved cavitation characteristics to permit maintaining the original setting above tailwater elevation.

Research results such as these indicate Allis-Chalmers can provide substantial economies in both new and existing installations with higher turbine speeds and settings as well as smaller spiral cases and inlet valves. For further information, write Allis-Chalmers Manufacturing Co., Hydraulic Division, York, Pennsylvania.

Since the Diablo units have gone into service, the city of Seattle advised that, prior to final testing, performance indicated that anticipated increase had been substantially met.

Hydraulic Division

RESEARCH | DESIGN
HYDRODYNAMICS
ENGINEERING | FABRICATION

Hydraulic Turbines & Accessories • Pumps • Liquid Heaters
Rotovalves • Ball Valves • Butterfly Valves • Free-Discharge Valves

AC ALLIS-CHALMERS

Readers Service

For additional information on new products, supplies, and services in this issue, the Manufacturers Editor of Electrical World offers his facilities. Check items in which you are interested in list below:

NEW EQUIPMENT

Cole .....Connectors ☐
Westinghouse .....Arresters ☐
Petersen .....Tensioner ☐
L-M .....Swich Operator ☐
GE .....Grease ☐
Holan .....Digger ☐
Kearney .....Clamp ☐
Westinghouse .....Control ☐
GE .....Carrier Equipment ☐

OTHER

_____

Manufacturers Editor
Electrical World
330 W. 42nd St.
New York 36, N.Y.

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FOR:

Reference ..... ☐
Specs ..... ☐
Trial ..... ☐
Purchase ..... ☐

MAY 4, 1959

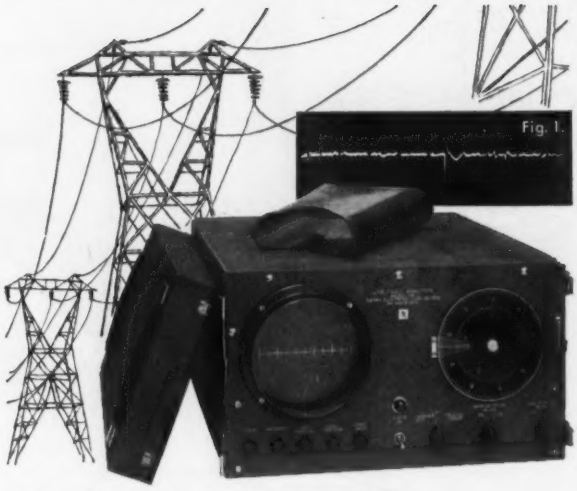


Figure 1. Display of 60 Kv line grounded at 27 miles.

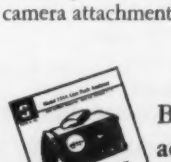
Locate circuit faults exactly ...½ to 200 miles distant

Communication and power lines
Use on any open wire line
Direct reading, simple to use
Use at carrier terminal, powerhouse, sub-station

Shorts, grounds or opens up to 200 miles away can be located within a few yards with the improved Sierra 124A Line Fault Analyzer. The instrument, operating on radar principles, sends a high amplitude pulse along the line under test. Discontinuities, even capacitors and transformer banks, appear clearly; a complete picture of the line and its condition appears on the radar-type "A" scope.

Two Pulse Widths

To insure maximum readability, two pulses — a 1 microsecond, 1,000 volt pulse or an 8 microsecond, 500 volt pulse —are provided. Other features include a sweep delay, movable distance step, sweep repetition rate of 60 cps and a high intensity flat faced cathode ray tube. Provision is made for camera attachment to the scope face.



Bulletin gives details, actual utility operating experiences

Data subject to change without notice.

Sierra Electronic Corporation
A subsidiary of Philco Corporation
4695T Bohannon Drive • DAvenport 6-2060
Menlo Park, California, U.S.A.
Sales representatives in Major Cities
Canada: Atlas Instrument Corp., Ltd., Toronto, Montreal, Vancouver, Winnipeg
Export: Frazar & Hansen, Ltd., San Francisco, New York, Los Angeles

Sierra

Insulated Connector Resists Corrosion

E. S. **RAILA**, Supervisor, Design Engineering Section, Utility-Industrial Division, Burndy Corp, Norwalk, Conn.

A pre-insulated compression connector called an "Insulink" reduces the problem of connecting services to a simple, tool-controlled operation that one man can perform easily. The corrosion-resistant connector can splice aluminum and copper cables ranging from No. 10 through 1/0 and ACSR from No. 6 through No. 2.

Designers had to develop a coating for the connector which could

1. transmit the pressure of the compression tool to the sleeve without being pierced;
2. electrically insulate the completed connection;
3. protect the connection against water and weather.

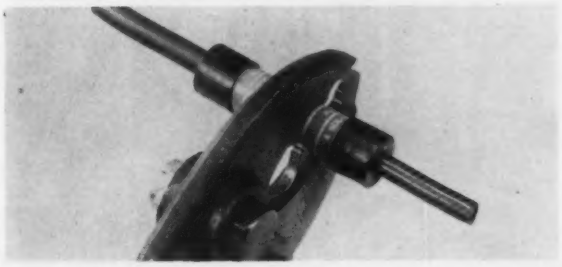
Additionally, the connector had to be installed with standard tools and compare with present splices in cost. Finally, a way had to be found to hold both cable ends in the connector while the lineman crimps it.

The connector consists of an aluminum sleeve, a nylon jacket and a polyethylene cap on each end. After testing a number of plastics, engineers found that nylon, with carbon black added to improve resistance to weathering, had the best combination of properties.

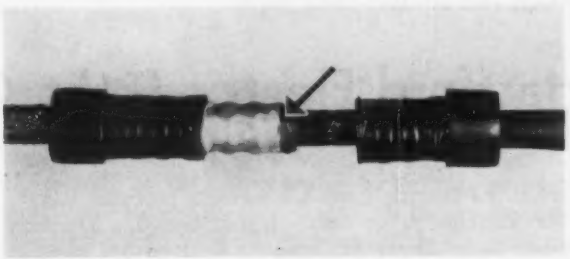
Splice sections were immersed in 5% (by weight) salt solution and subjected to 1,500 v for 1 min. After immersion for 168 hr, no leakage was detected.

Repeated current cycling showed the electrical stability of a No. 2 stranded aluminum to No. 4 stranded copper service entrance splice. A 170-amp current was passed through the splice for 1½ hr, raising conductor temperature to 125F, after which current was turned off for an hour. After 114 cycles, relative conductivity of the splice was unchanged.

After 500 hr in a concentrated salt spray, samples showed no erosion of connector or conductor due to galvanic action.



STANDARD TOOL crimps pre-insulated connector. Taping of splice is eliminated, thus reducing time required



CUTAWAY VIEW of splice after salt spray chamber exposure shows no corrosion. Arrow shows oxide inhibitor.

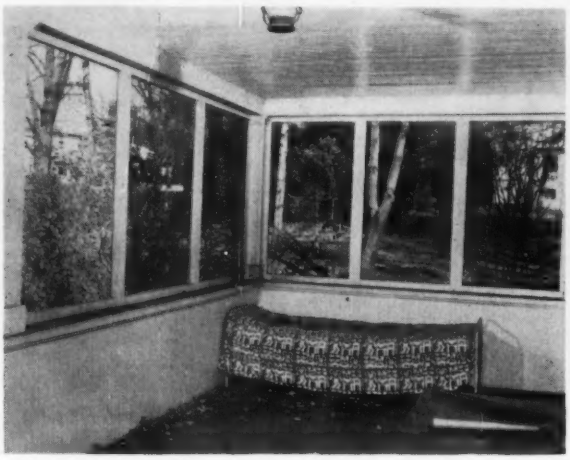
Split Conduit Elbow Reduces Bottlenecks

J. A. **TAYLOR**, Outside Plant Development Dept, Bell Telephone Laboratories, New York, N. Y.

A conduit elbow that has been split lengthwise can help eliminate bottlenecks in underground systems. Developed by Bell Telephone Laboratories for telephone cable, the design can be adapted to electric power cable.

The fitting is essentially a standard conduit elbow split lengthwise and held together with clamping bands. To provide ease of installation, the circular bands are two-piece units with identical halves. One end of the curved half-band is formed to mate with the other half in a slip-joint hinge. The other end has a flange with a bolt hole for bolting both halves of the band together securely.

—Photo by Bell Laboratories Record



When this seldom-used porch . . .

was comfort-conditioned the year around . . .

Hartford Electric Light Added 8,000 Kwhr

Hartford Electric Light Co added a potential 8,000 kwhr annually to its lines when it helped a Darien, Conn., home owner modernize a seldom-used porch. The modernization, part of the utility's activity in the Live Better Electrically Modernized Home Program, involved enclosing the 8½x22-ft porch, installing a through-the-wall heat pump, and wiring the room with a low-voltage remote-control system.

The main light source for the modernized porch is a row of five, 40-w, fluorescent tubes installed end-to-end along the long outside wall behind a valance. Additional illumination is supplied by a recessed ceiling fixture and by floor and table lamps.

Split-wired convenience outlets were installed along both long walls. The outlets are in pairs, left-hand ones permanently "hot" for small appliances, and right-hand ones connected through the low-voltage remote-control switch panels for plug-in lamps.

The switch panels also control the fluorescent and ceiling fixtures and three 3-light clusters of PAR outdoor lights. Outdoor lighting helps eliminate the "black mirror" effect common to large glass areas at night and instantly lights the grounds in case of prowlers. The fluorescents are connected through a dimmer control.

Initially, the home owner planned to run ducts from his warm-air furnace to the porch. But after talking it over with utility representatives, he installed a 1-hp GE Thinline heat pump with a capacity of 10,200 Btu per hour. The unit is wired to a separate 230-v circuit.

The porch was well insulated to keep the heat pump's operating cost to a minimum. Six-in. thick batts of mineral wool were used in the floor and ceiling and 3-in. in outside walls.

The old 60-amp load center was replaced by a 100-amp service entrance with 20 circuits, 17 in current use and three for future needs.

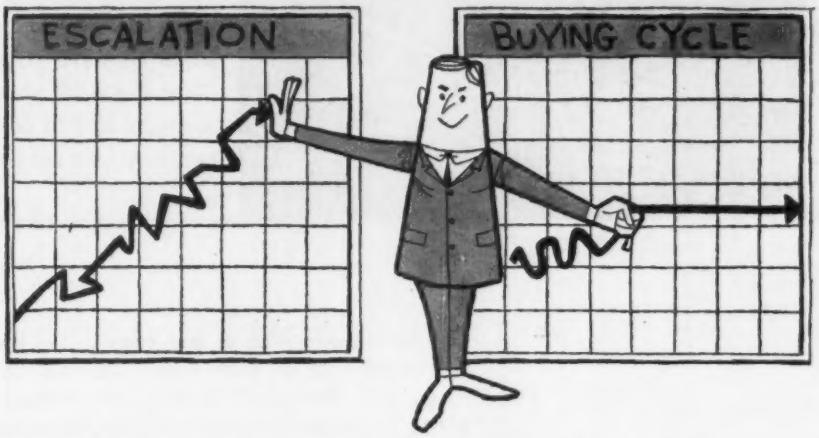
The added load breakdown:

Lighting	1,560 kwhr
Heating	5,000
Cooling	700
Plug-in appliances	500
	7,760 kwhr

'Beat the Heat Week' Will Be May 17-24

"Beat the Heat With an Air Conditioner" has been chosen as the theme for the "first united sales promotional campaign" of the room air conditioner industry. The campaign will be highlighted by "Beat The Heat Week" May 17-24 to acquaint the public with the latest developments in room air conditioners and to encourage prospective buyers to make their selections in advance of hot weather.

Joseph B. Ogden, chairman of the Room Air-Conditioner Section of the National Manufacturers Assn, and vice president of the Airtemp Division, Chrysler Corp, predicted that retail sales of room air-conditioners this year would reach between 1.6 and 1.75 million, topping the 1.35 million total of 1958.



By stopping escalation, smoothing the buying cycle . . .

'Buy & Store' Plan Can Cut Costs

Report on
Heavy Equipment

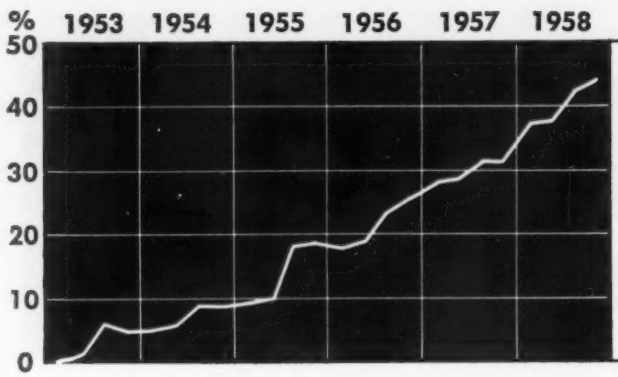
Utilities can save from 5% to 10% on the cost of boilers by ordering ahead of time, accepting early delivery, and storing the components on the construction site until the time when erection is scheduled. This conviction is the basis for an "Advance Buying and Manufacturing Plan" developed by Combustion Engineering, Inc, one of the nation's largest suppliers of utility boilers. As evidence in support of the plan, Combustion offers sample calculations (audited by a top public utility accounting firm) and the fact that it has already sold boilers to two utilities this year on a "buy and store" basis.

Combustion's "buy and store" plan is concerned only with boilers, but the principle embodied in it could have wider application. There's a good chance that turbine generators, power transformers, and many other major utility purchases might be ordered in the same way—to the benefit of both the manufacturers and the utilities themselves.

Twin targets of the plan are price escalation and cyclical buying. The manufacturer benefits from a smoothing out of the buying cycle: If utilities place their orders early and are willing to accept delivery ahead of time, the manufacturer can spread out his production schedule and use his facilities and his people more efficiently. At the same time, say the authors of the plan, the utilities have much to gain.

The best reason for a utility to consider buying early, according to the manufacturers, is that companies placing eleventh-hour orders for equipment needed in 1962 and 1963 may run the risk of late deliveries (EW, Feb. 2, 1959, p 63). Combustion Engineering also feels, however, that the practice of early buying and on-site storage can save money for a utility—basically through reductions in escalation charges.

Escalation savings should outweigh the extra costs of storing the components on the site and the increased interest charges due to early buying, the company believes. Additional savings should accrue from more efficient erection of the boiler, since all components will be on hand at the start of the operation. Net effect, according to the boiler firm's calculations, is that the earlier a utility can take delivery, the greater will be its savings.



If past trends continue, escalation of boiler prices can be expected to keep on at a rate of about 7% per year. The example at the top of the opposite page shows a 10% saving made possible by the "Buy & Store" plan. Use the worksheet below the example to find out if advance buying and storage can help you cut costs.

The basic assumption is that costs in the boiler industry will continue to rise during the next six years at the same rate that they have risen in the last six. From 1953 through 1958 these costs showed an average increase of about 7% per year, and this was reflected in escalation charges to the utilities. If this trend continues, the annual escalation for each million dollars invested will come to about $70,000. Therefore, if a utility can order a boiler ahead of time and accept delivery a year before its erection is scheduled to begin, it can realize a gross saving of $70,000 for each million dollars invested.

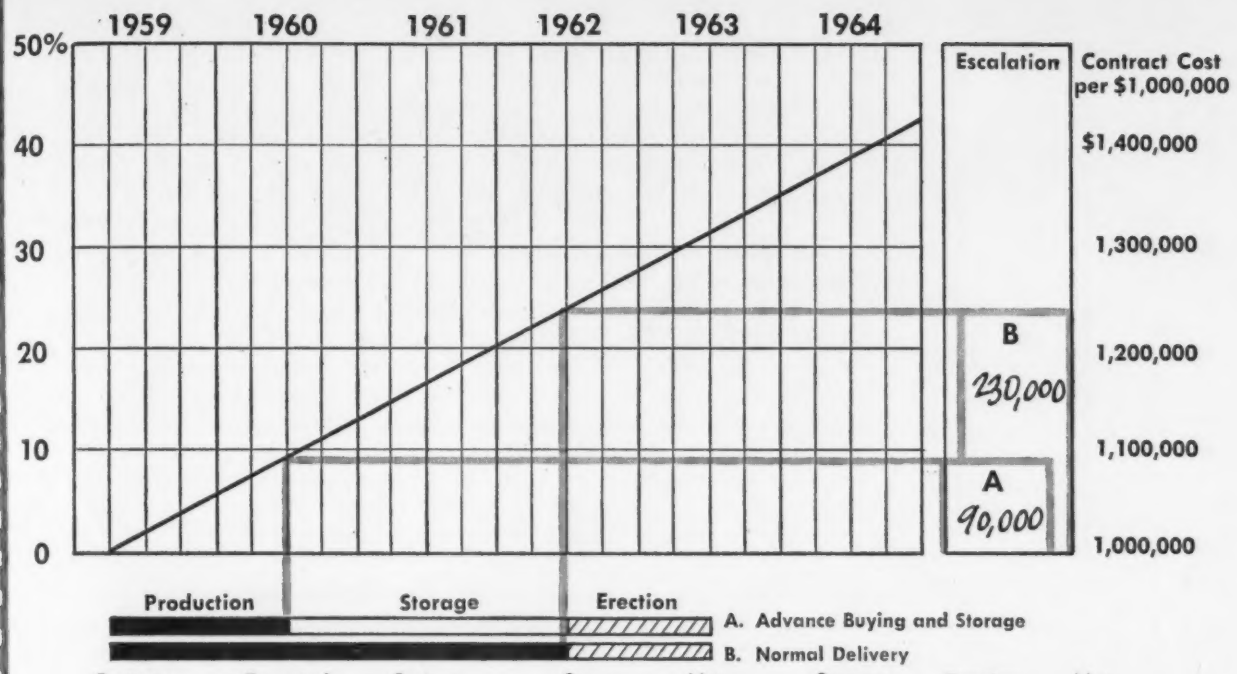
The utility would also incur extra expense by taking early delivery. Boiler components would have to be stored and protected at the utility's expense, and they would have to be paid for earlier—increasing interest charges. On the other hand, a saving would accrue from more efficient erection if all materials were on hand at the start of erection and stored in such a way as to permit ready access when needed. The example on the opposite page shows the savings that might be realized by a utility using the "buy and store" plan for a boiler needed in the middle of 1963. For each million dollars of the order, authors of the plan calculate that the utility would save $106,800 by ordering early and accepting delivery in the middle of 1960 instead of the middle of 1962.

Bar "B" represents the time schedule of an order for delivery of a boiler in mid-1962—a normal schedule allowing one year for erection. Bar "A" represents the timing of the same boiler order under the "buy and store" plan—where delivery is due in the middle of 1960 and the components are to be stored on the construction site for two years. The boxes below the bars show estimated charges (for each million dollars of order) using each alternative.

Assuming that the order is placed in spring 1959, the earliest time a utility can expect a boiler to be shipped would be mid-1960. Therefore, escalation is taken to be $90,000—based on 15 months of rising manufacturing costs. If delivery is not called for until the middle of 1962, however, the price of the boiler could go up by another $140,000 per million dollars—$70,000 each year—owing to escalation. Total escalation would then be $230,000 before the order is filled. There will be no storage costs, no net interest charges for early delivery, and no erection savings due to ready access to components. This means that the final cost of the hypothetical million-dollar boiler would come to $1,230,000.

With the "buy and store" plan, escalation would be reduced by $140,000—since the contract would be settled two years sooner. The utility would, however, incur the extra costs of storing components at the site and would have to pay interest charges for the two additional years. Set against these extra costs would be the savings due to more efficient erection of the boiler.

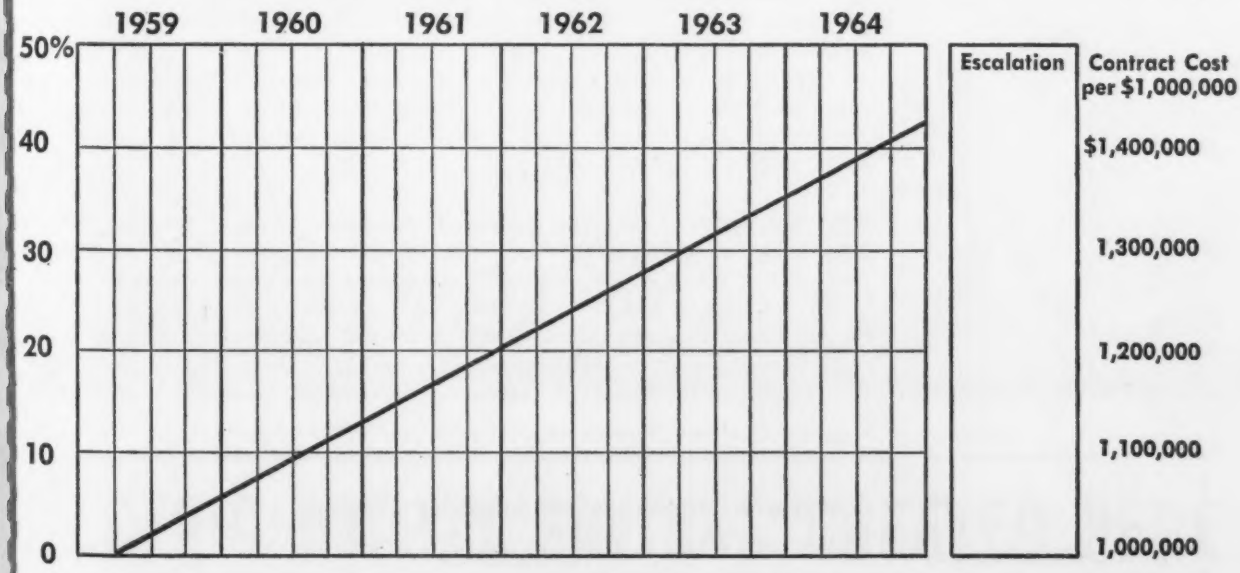
Each utility would have to work out its own estimates of these charges, but Combustion has taken what it considers to be typical figures. For storage, the

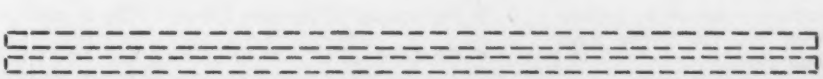


	Cost at Order Date	+ Expected Escalation	= Cost at Delivery
A	1,000,000	90,000	1,090,000
B	1,000,000	230,000	1,230,000

Gross Saving	− Net Interest	− Storage Charges	+ Erection Savings	= Net Savings
140,000	36,700	12,500	16,000	106,800

Interest at ½ bank loan rate; Storage charges at 1% for first year, ¼% each additional; Erection savings at 5%.





	Cost at Order Date	+ Expected Escalation	= Cost at Delivery
A			
B			

Gross Saving	− Net Interest	− Storage Charges	+ Erection Savings	= Net Savings

example shows $10,000 per million dollars of order for the first year, and $2,500 for each additional year. It is observed that the major portion of the equipment can be stored without cover, while only the critical items with machined parts (valves, pumps, etc.) need be protected from the weather. To house these critical items, it is contemplated that the erection field office could be built prior to shipment, providing ample cover.

In establishing probable net interest costs to be charged against the "buy and store" plan, it has been assumed that the utility would borrow 90% of the $1,000,000 in short-term bank loans (10% is retained until the approximate date of operation). These bank loans would be an interim financing plan which would carry up until the time when the utility's normal long-term financing would be put into effect. The example shows the short-term loan at 4%—the prime rate, which would probably be available to most utilities for a loan of this type. Since half of the interest paid would be recoverable in the form of a reduction in corporate income tax, the net interest charge attributable to the "buy and store" plan would be 2% of $900,000 for each year of storage—compounded in the example to $36,700 for each $1 million invested.

Erection savings are assumed to be 5% of anticipated erection costs, although the boiler firm's engineers feel that they could be much greater. Having all components on hand ahead of time allows orderly placement and offers the possibility of sub-assemblies on the ground. The erection crew could work systematically and with less lost motion—especially when compared to the delayed and out-of-sequence erection that might result if fabrication takes place at a time when the manufacturer's production facilities are overloaded. Allowing for some escalation in erection costs, the savings in the example are estimated at $16,000 per million dollars invested.

The total net saving in the example comes to $106,800, or 9.8% of the final cost of the boiler. This is assuming that the components are delivered to the site two years early. If three years of storage are assumed, the saving would rise to 14.3%, but many engineers feel that this is impractical, as they might lose out on important technological advances by freezing the design that much ahead of the time when the boiler is needed. Similar calculations show savings of 5.2% for a boiler delivered one year ahead.

The plan is not presented as a cure-all, and the example shown is purely hypothetical. The principle of early ordering and on-site storage to beat price escalation, however, seems to be worth considering not only for boilers but for other equipment as well. All that is needed is a predicted escalation curve for the equipment in question and a study by the utility to determine whether or not advance planning, ordering, and delivery will cut its costs.

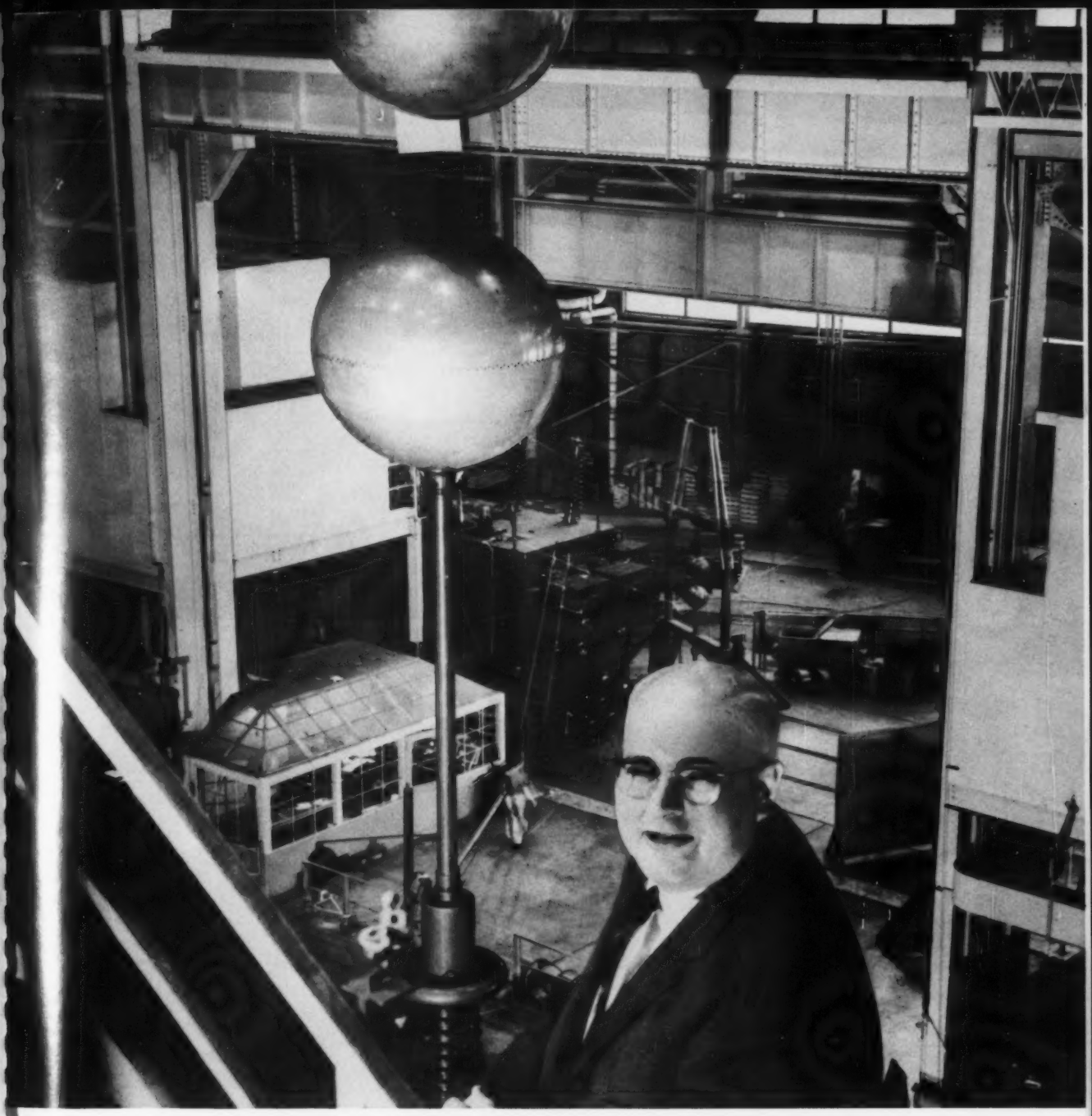
Here Are the Advantages of Advance Buying

To the Manufacturer . . .

- Peaks and valleys in production caused by cyclical buying tend to be leveled out. This allows more efficient use of production plant.
- Manpower requirements are leveled out, allowing more efficient use of workers and fewer layoffs.
- Engineering and fabrication can be accomplished without the pressure of deadline completion dates.

To the Utility . . .

- Net savings of between 5% and 10% in total cost.
- Flexibility as to start of erection and start-up.
- Eliminates additional cost incurred if, when ready to purchase, delivery can't be made in time.
- Ultimate reduction in first cost of future units, since manufacturers' costs are reduced.



Mr. John C. Rissinger, Sales Manager, Power Transformer Department, in test center where Westinghouse studies today the problems which electric utilities will face tomorrow.

ELECTRIC UTILITY SAVINGS CREATED HERE

Giant research test center creates dollar-saving transformer Bonus Values

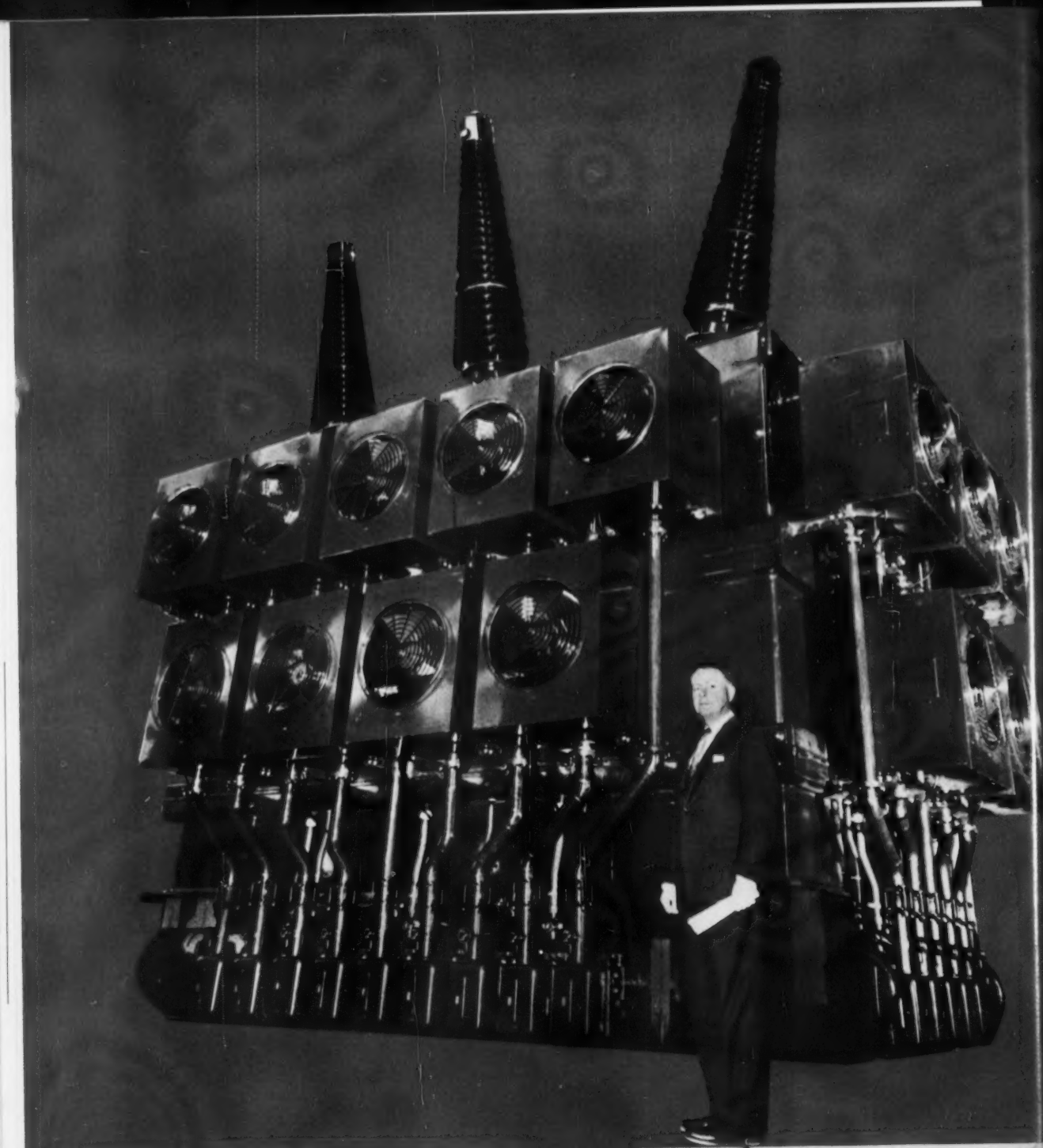
America's tremendous electrical growth has generated many problems for the country's electric utilities . . . problems of handling larger blocks of power, achieving more economical transmission, maintaining customer good will.

The Westinghouse Power Transformer Department is proud of its contributions toward helping utilities meet their current and long-range problems. From the research facilities at Sharon have come developments that have brought the industry installation, maintenance, operating and performance savings. These are the actual dollar benefits—the Bonus Values—found in new developments from the Westinghouse Power Transformer Department. These developments have been made possible through Westinghouse Plowback of Earnings into research and development.

YOU CAN BE **SURE**...IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS"
CBS TV MONDAYS



The Insuldur system knows no bounds, as pointed out here by Mr. M. E. Fagan, Manager, Westinghouse Power Transformer Engineering Department, shown with a 345-kv, 275,000-kva, 3-phase Westinghouse power transformer with Insuldur insulation system.

INSULDUR SYSTEM ADDS 10% EXTRA OVERLOAD CAPABILITY... SAFELY!

Another exclusive Westinghouse Bonus Value created by Plowback of Earnings

The exclusive Insuldur* system now used in all Westinghouse power transformers beats the heat—retards deterioration of transformer insulation. The Insuldur system utilizes an amine stabilizing compound which gives insulation the ability to withstand higher temperatures . . . safely.

No matter what your present overload practice, the Insuldur-protected Westinghouse transformer can carry 10% more overload than any other transformer built . . . with no additional loss of insulation life.

Here is your means of allowing more overload—and obtaining more revenue—economically . . . and safely. For example, if you can economically justify overloading an ordinary transformer 125% for 24 hours, an Insuldur-protected transformer can be overloaded 135% for the same time—with no extra loss of insulation life.

The exclusive Insuldur system now protects all Westinghouse power transformers —large power, substation, network, CSP* power and mobile substations.

Ask your Westinghouse representative about the Insuldur-system protection for all power transformers. He can show you the "Crumble Test"— dramatic proof of added insulation strength.

*Trade-Mark

The "Crumble Test" shows superior heat-aging resistance of exclusive Westinghouse Insuldur-system insulation . . . proves that overload conditions endanger the life of ordinary insulation. During overload tests, ordinary insulation has charred, crumbled and "died", Insuldur-system insulation has bounced back . . . stayed "alive" . . . providing safe, extra overload capacity.

FOR LOW-COST REGULATION:

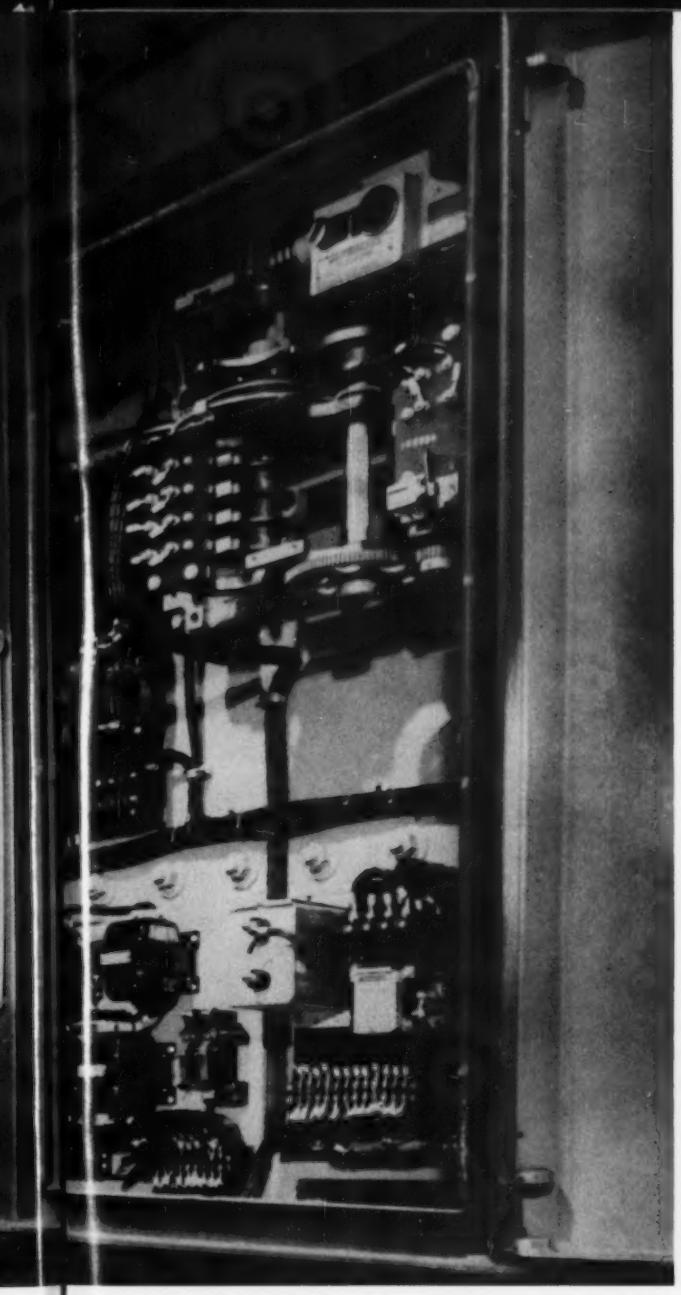
Since the introduction of Magamp control just three years ago, over 1200 units have been supplied for load tap changing equipment placed in service by electric utilities. Today, these Magamp units continue to deliver trouble-free performance after a total of over 83,000,000 tap changer operations.

Magamp means trouble-free, maintenance-free service under all conditions when used on a station-type voltage regulator, an LTC transformer or a CSP power transformer.

Magamp control is completely static. There are no moving parts to clean and adjust, no contacts to check and burnish, no relays to be rebalanced. Magamp control settings are all electrical . . . and the "set-and-forget" control never needs adjustment.

The Westinghouse load tap changer is another important factor in providing low-cost regulation, with minimum maintenance. Its direct-drive Geneva gear mechanism assures optimum speed of moving contacts to prevent burning. It provides shockless acceleration and deceleration, has been tested to eight million operations with no appreciable wear. This means extra years of contact life.

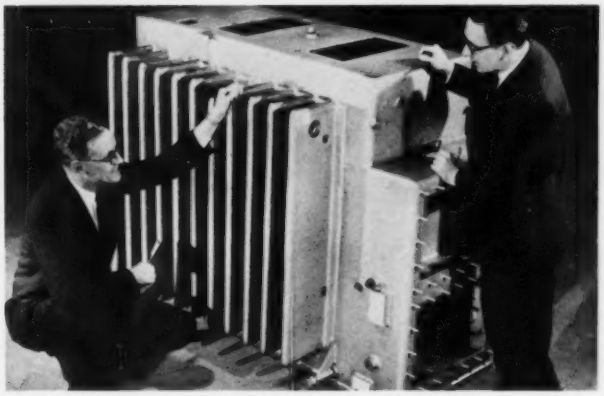
Westinghouse offers an exclusive 20-year prorated warranty on contact life for URS tap changers—regardless of the number of operations.



Maintenance-free Magamp control and 20-year minimum tap changer contact life

Ask your Westinghouse representative to show you how Magamp control and the direct-drive tap changer combine to improve your power distribution economics, with reduced regulation and maintenance costs . . . a double dollar-saving Bonus Value made possible by Westinghouse Plowback of Earnings into a continuing program of research and development.

Mr. Don Ralsten, Westinghouse sales engineer, and Mr. John Harrell, Manager, Westinghouse Network and Regulator Sales, review the moneysaving advantages of Magamp control in this LTC substation transformer on the system of a progressive midwestern utility.



Mr. J. C. Gardner (left), Westinghouse network transformer sales, and Mr. G. A. Monito, network transformer engineering, discuss the improved tank construction of the new Westinghouse universal design network transformer.

NEW SPACE-MISER NETWORK TRANSFORMER ADDS FLEXIBILITY, CUTS MAINTENANCE

New Westinghouse universal design for Space-Miser network transformers can be used in either vault or subway applications. This single design replaces the two designs formerly necessary. Stocking is now greatly simplified; a utility which has had to maintain stocks of spare units for both applications now can stock only units of this universal design, and inventories can often be substantially reduced.

Save on maintenance, too . . . The coolers are now made of heavy copper-bearing steel. This new design provides better protection against corrosion. The number of welds has been reduced by 30%; the welds in the cooler area are made by an automatic welder, giving smoother, more uniform welds which permit better paint adhesion, better protection in these critical areas.

The new Westinghouse Space-Miser with universal design retains all of the advantages of the standard Space-Miser construction—small size, round-cornered tank and Yukon coolers.

Ask your Westinghouse representative for the full story of the new universal design network transformer—available in ratings of 300, 500, 750 and 1000 kva at 5, 15, 25 and 34.5 kv.

YOU CAN BE SURE...IF IT'S Westinghouse

YOU CAN BE SURE... IF IT'S
Westinghouse
Westinghous

In photo at left, T. A. Kraft (right), Budget and Application Engineer, Ohio Edison Company, with Westinghouse representative S. S. Waters, as they analyze a spec for one of the new features of the redesigned Westinghouse substation transformer. Below, Messrs. Kraft and Waters at installation site of the new, streamlined Westinghouse unit now in service at Ohio Edison's McKnight Substation in Akron.

IMPROVED APPEARANCE, LOWER SOUND LEVELS BUILD BETTER CUSTOMER RELATIONS

...."Better Neighbor" Bonus Values created from Westinghouse earnings reinvested in development. This new line of Westinghouse substation transformers meets the electric utilities' needs for more attractive, quieter transformers to be located in residential areas. Streamlined and uncluttered, these new units will reduce complaints of unsightliness from your customers. Here's how appearance has been improved:

- Rounded-corner tank permits better paint adhesion and coverage, stops ugly corrosion before it starts.
- Elimination of external braces takes away other sources of corrosion, prevents debris trapping.
- Randomly scattered gauges and valves have been relocated in a weatherproof enclosure conveniently placed at eye level.

This all adds up to better appearance, better customer relations . . . and because many possible target areas for corrosion have been eliminated, these new transformers will reduce maintenance costs, too.

The lower sound levels of these new substation transformers are another step toward better customer relations, are expected to reduce the "noise" complaints of your customers. In many cases, there will be a direct dollar-saving benefit to utilities—no costly sound dampening barriers and enclosures.

Your Westinghouse representative will be happy to tell you the full story of this new line of streamlined, quieter substation transformers.

HOW WESTINGHOUSE IS SAVING ELECTRIC UTILITIES MILLIONS OF DOLLARS...

These seven Bonus Values, created through the years by Westinghouse, continually save millions of dollars in installation, maintenance and operating costs:

- **Reduced Sound Levels**—Westinghouse power transformer sound level reduction—saves up to $17,000 on original cost.
- **Inner-Cooled Construction**—Space and weight reduced up to 15%, with lower impedances and improved performance.
- **Vapor Cooling**—Westinghouse V/g transformers combine dry-type safety with the capacity and BIL of liquid-filled units.
- **"Form-Fit" Construction**—Westinghouse power transformer construction has for years been outstanding for high mechanical and dielectric strength.
- **Shipping by Schnabel Car**—Extra "room to grow" for future transformers; even supervoltage transformers can be shipped in one piece.
- **Standardized Condenser Bushings**—Westinghouse bushings set industry standards for fifty years, needed no design change to meet new ASA standards.
- **Forced-Oil Cooling**—Another Westinghouse-pioneered concept, forced-oil cooling has saved electric utilities over $100,000,000.

These and other developments created by Westinghouse research continue to provide the equipment to meet America's growing power needs—economically.

JI-70900

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS"
CBS TV MONDAYS

Empire District Elects Drewelow President

Earl J. Drewelow has been elected president of Empire District Electric Co. He succeeds D. C. McKee who was re-elected chairman of the board. Drewelow is the former vice president and general manager.

JONES

J. T. Jones, who had been assistant general manager, was elected vice president and general manager. Mark E. Whitaker, former secretary and controller, was given the duties of treasurer. James P. Dodge succeeds Whitaker as secretary.

Drewelow has had 35 years experience in electric utility operations. He joined Empire District Electric Co in 1927 as power plant efficiency engineer. He became chief engineer in 1929 and superintendent in 1945. In 1949, he was named assistant general superintendent of operations, and, in 1951, was elected vice president in charge of operations. He was appointed assistant general manager in 1954, and became general manager in 1955.

Jones has been with Empire District Electric for the past 24 years, principally in the merchandise sales and service department. He headed the department until 1956 when he was appointed assistant general manager.

DREWELOW

Kiel Named VP at Long Island Lighting

Long Island Lighting Co has elected Charles Kiel, Jr., vice president, operating services. He was formerly manager, operating services.

He joined Long Island Lighting in 1933 in the construction department after working for E. L. Phillips Co as field construction engineer. He was superintendent of Queens Borough Gas & Electric Co's electric power plant from 1939 to 1945. For the next four years, he served as superintendent of Glenwood Power plant, and then, in 1949, was made superintendent of LILCO's electric production.

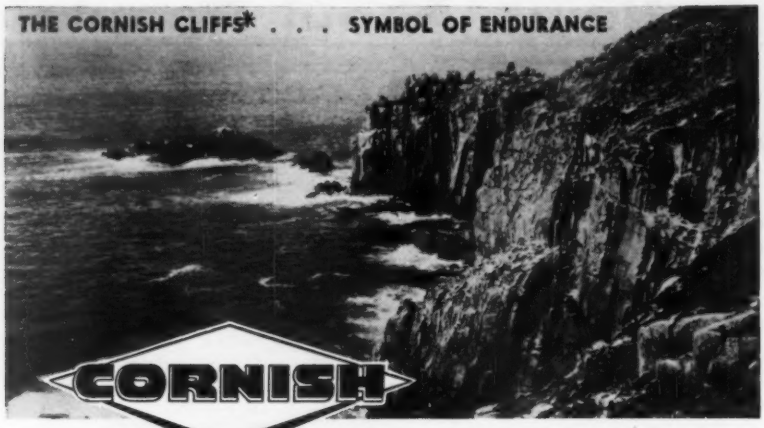
From 1951 to 1953, he was electric production manager, and assistant electric operating manager until 1957.

Hetherington Appointed VP-Operation

Robert M. Hetherington has been made vice president in charge of operation, for Iowa-Illinois Gas & Electric Co. Formerly assistant to the president, he will be succeeded by Raymond C. Judd who has been assistant manager of the electric transmission and distribution department.

Hetherington became associated with Iowa-Illinois as an industrial sales engineer in 1946. He was named assistant manager of the gas department in 1950, manager of the department in 1954, and assistant to the president in 1957. Judd has been with the company since 1934.

(*More News About People on page* 106)



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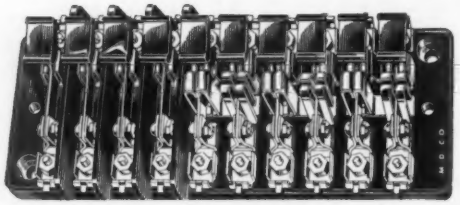

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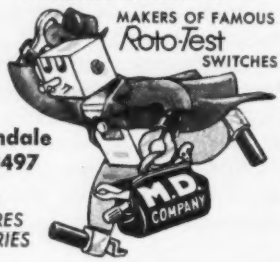

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H-3

Leach Appointed EW Western Editor

Paul H. Leech has been appointed Western Editor of Electrical World, with office in San Francisco.

He spent the last 11 years with the General Electric and International GE companies on utility and industrial heavy apparatus sales. He began his career on the GE student course, and after atomic energy and radar activities during the war, returned to GE in 1946 to do design engineering at Schenectady, N. Y.

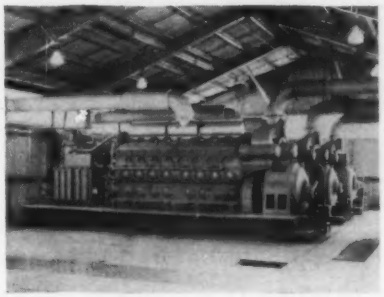
He will replace C. F. Hochgesang who will become assistant to the editor in Electrical World's New York office.

Duquesne Light Appoints Kutschbach To New Post

Duquesne Light Co has appointed Carl B. Kutschbach general superintendent of construction.

He has been with the company for 40 years. Prior to his new appointment he was manager, power

Substantial savings on turnkey Diesel Generators at nuclear fuels plant



New G.M. Electro-Motive Division 3000/5000kw dual fuel power plants in turnkey installation at Kermac Nuclear Fuels Corp., Grants, New Mexico, are typical of the reliable 500kw, 750kw and 1000-kw AGSCO-engineered diesel generating units available from stock at substantial savings to you.

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HAI-2

stations section. He has also held the positions of superintendent of construction, construction and safety supervisor, and foreman.

From 1944 to 1945 he was on loan to the Kellex Corp Manhattan Project where he served as coordinator of the manufacturer's products such as switch gear, transformers, turbines, control boards and boiler parts.

PERSONAL BRIEFS

Frank E. Wiatt, assistant manager of the electric sales department since 1948, has retired from Cincinnati Gas & Electric Co.

R. A. Moody, assistant treasurer and tax consultant, and **Herbert S. Thompson,** district sales manager, Pomona, have retired from Southern California Edison Co.

James E. Griffin has been made a division manager for Mississippi Power & Light Co.

Duke Power Co has promoted **William E. Tarpley** to commercial manager and **Harry Beeker** to residential representative.

Harry Young has joined Pacific Power & Light Co's property department as assistant manager.

Harvey J. Bell has been named general superintendent of the Southern Indiana Gas & Electric Co's operating departments.

Detroit Edison Co employees **George L. Schlaepfer,** coordinator of international cooperation programs, and **Frank M. Mason,** manager of the Romeo, Mich., office, have been awarded the company's Alex Dow Award for outstanding achievement.

Georgia Power Co has made the following appointments: **H. C. Woodson** to assistant operating manager in the company's general offices; **H. G. Moore,** Atlanta Division manager; **L. B. Locklin,** manager of the newly created production department; and **R. S. Causey,** production department superintendent.

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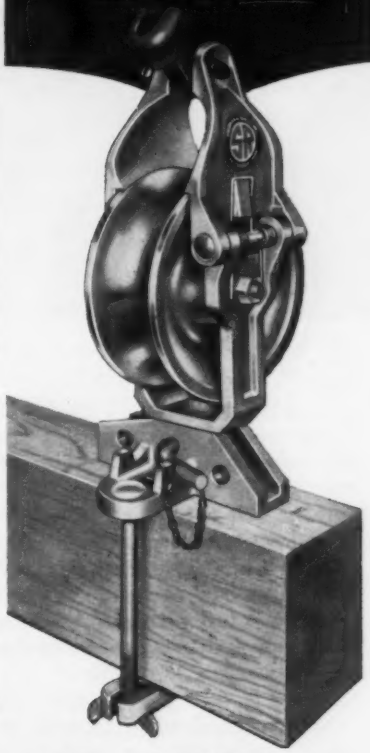

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W. L. **CHADWICK** discusses meeting business with R. L. Brinton, Pacific G&E Co, who acted as chairman of Engineering and Operating Section meeting

Chadwick Addresses PCEA Group

SoCal-Edison head cites cost drag on recent power developments, and DuBois describes new excitation system

Is computer-programmed control of cold start, operation, and economic loading of generating stations really such a big step? Originally, stability and continuity requirements forced line and apparatus fault isolation at speeds exceeding human reaction. A turbine had to be cleared fast enough to prevent serious damage or mechanical trouble.

In this vein, W. L. Chadwick, Southern California Edison Co vice president, set the pace for the recent Pacific Coast Electrical Association's Engineering & Operating Section conclave at Long Beach, Calif.

Other points he made were:

1. Super-temperature and supercritical pressure must pay off. High-temperature metallurgy hasn't improved the crucial cost factor, so that users' heat rate gains are offset by jumps in turbine, piping, and boiler costs.

2. Obligation to customers demands fuel conversion with minimum atmospheric contamination. Equally, there's responsibility to inform them of the true power plant-air pollution relation.

3. Who can say whether interconnection of the whole country is visionary? But "rampant imagination" is needed to solve insulation and protection problems before the requisite transmission at twice present voltage levels is ready.

4. The "hard way" to research lower costs for the whole underground system is to wait until the utilities are ruled off the street. No one group is now accountable; the one cooperative (Cornell EHV cable) project is only a start.

5. Fear of innovation is one of the greatest hazards overall. America and the industry were made by innovation balanced with judgment.

The exciter of tomorrow will eliminate commutators, slip rings, and brushes announced E. W. DuBois, Westinghouse Electric Corp. The rotating armature of a shaft-driven exciter—a synchronous generator—will supply the main generator rotating field through a silicon-diode rectifier assembled on the shaft. A 180-kw, 250-v, 3,600-rpm prototype, he said, will replace a conventional shaft exciter for West Penn Power Co.

Exciter Described

The new system, DuBois said, will include a 3-phase, 420-cycle synchronous exciter and a multiphase bridge-circuit rectifier. A typical silicon diode unit, rated above 200 amp at 190C junction temperature would operate more conservatively. Experience in aircraft systems and two years' laboratory tests proved feasible operation of the silicon rectifiers at high rotation. Static amplifier regulation, controlling the ac exciter stationary field, will be conventional.

Rapid strides in cutting the cost of flash-type evaporators warrants serious study of their potential for producing mass quantities of potable water from seawater using steam plant reject heat, said E. F. Stalcup, Westinghouse. Developments in evaporator construction and moisture separation gave boiler feed-purity distillate directly from seawater. Even polluted water can now be a source for the extreme-purity makeup demanded by high-pressure, high-temperature boilers, Stalcup said.

Success with hydro turbines in unattended stations bids to ensure that all future hydro plants will embody automatically programmed lubing from central systems, said M. T. Broderson, Pelton Div of Baldwin-Lima-Hamilton Corp. This will end the "hit-and-miss" manual lubing systems, complicated by the roughly 140 lube points on the typical modern machine, he said.

Residential distribution at 240/480 v single-phase is economical where load densities exceed 2.5-kva coincidental demand per house, and distribution is underground, said T. A. Bettersworth, Pacific Gas & Electric Co. Net saving over 120/240-v secondaries is 9%, or $43 per lot. Acknowledging that trials of the new voltage are needed to demonstrate feasibility, Bettersworth pointed to new subdivisions for which underground distribution is specified as the logical, economical locales for the tests.

Average utilization of each distribution transformer on a circuit can be estimated with reasonable accuracy by a statistical method employing circuit and sub-circuit peak

demand readings, said R. D. Ladd, Southern California Edison Co. The curves account for circuit feedback, capacitor performance, losses, type and connected-load class of homes, seasonal and daily diversities.

Efficient economic loading of distribution transformers is best realized by initial installation of optimum capacity and refined statistical methods of checking utilization across the years, he added.

Spring washers, ensuring protracted firm contact from wood to line-hardware metal, are being tested by SoCal-Edison, said J. O. Harris, Jr. Definite cost savings over the present method of bonding all arm-contacting hardware with No. 8 copper bondwire are possible. The relatively costly bonding prevents crossarm and pole burning at contact points, and virtually stops radio and TV interference.

Life tests on line hardware exposed to sea spray confirm after only a year that aluminum-bodied clamps cannot use dissimilar metals or plated connectors, said M. K. Dean, Hawaiian Electric Co. Plated connectors caused aluminum conductors to fail in a few months. Aluminum-bodied connectors with galvanized parts corroded quickly.

A small auxiliary rectifier and anode next to pipe-type cable ends provides economical control of cathodic protection current when protective flow from station ground network to main anodes becomes excessive, said H. H. de Laneaux and R. O. Dean, PG&E. The auxiliary minimizes transient or circulating currents which produce spurious test data. The main protection units at the terminals maintain proper pipe-to-ground network potential while the auxiliary supplies protective current.

Hydraulic, electric, pneumatic, and mechanical power for PG&E line trucks may be provided by a compact package unit skid-mounted across the truck directly behind the cab, said L. J. Abell. The power pack, driven by a Willys 60-hp gasoline engine, has a winch, hydraulic system, air compressor and ac/dc generator. All devices except the generator are hydraulically driven. Control is by valves manipulated by airplane cable from the cab. Premature main engine overhaul, now costing PG&E $70-80,000 annually, would be eliminated.

Southwest Utilities Hold Talks

Today's capacity investment costs must be balanced against tomorrow's operating charges as the latter reflect continuing inflation, the Southwest Electric Conference was told at its recent annual meeting at Chandler, Ariz. The speaker was J. B. Thomas, Texas Electric Service Co president.

Such economic evaluation, he said, often indicates machine size as large as the system can stand.

A generator excitation system, including an ac exciter and a semiconductor rectifier, all rotating with the main machine, will be introduced soon, said G. A. Price, Westinghouse Electric Corp board chairman. The system, he said, will be without brushes, rings, and commutators.

New turbine blading, Price continued, will make an 800-Mw cross-compound unit a realty. It will reduce electric production costs 1%. New pouring and forging methods, he added, will permit construction of shaft steel for a 384-Mva single-shaft generator.

"The people's atom" is already replacing "the people's water" as a slogan of Federal ownership advocates, declared Rep. W. A. Miller (R., N.Y.). The electric industry's future depends in large measure upon ownership of nuclear power plants if, as is generally believed, the bulk of electric power will eventually come from such sources.

Edwin Vennard, EEI vice president and managing director, urged utilities to continuing educating the public in basic economic facts.

Decision-making at the lowest organizational level is encouraged in recent revisions of Arizona Public Service Co's management structure, reported President W. T. Lucking. There is now opportunity for young middle-level managers to make decisions based on self-set objectives for which they are accountable to upper management.

Industry goals of 1.5 trillion kwhr annual sales by the next decade's end could be stymied by loss of industrial load to REA's having 2% money along with tax privileges, said D. S. Kennedy, Oklahoma G&S president. Some pipeline concerns encouraging REA's to serve them at rates slightly lower than those of the private company in the area, despite common interests with the latter, he said.

D. W. Reeves, Public Service Co of New Mexico president, was elected chairman of the 1960 conference, succeeding M. L. Kapp, Interstate Power Co president. J. W. McAfee was elected the new vice chairman.

CONFERENCE brought together (usual order) J. B. Thomas, Texas Electric Service; W. W. Lynch, Texas P&L; B. S. Jeffrey, Kansas P&L; Edwin Vennard, EEI

Looped Microwave Links System (*Continued from page 54*)

sion. Six of the nineteen channels are tone-multiplexed for impedance relaying of twenty-two 161-kv transmission circuits, twelve of which are already in use or scheduled for early service. Five channels are used for supervisory control, indication and spot telemetering of oil circuit breakers at the generating plant and each of the four primary substations.

Two channels provide voice communication, one of which is a party line between microwave locations and the other a private circuit between the load dispatcher and the generating station control room. Four channels telemeter impulse and continuous interchange metering information from interconnection points with other utilities and the generating station. One channel provides teletype communications between the load dispatcher's office and the generating station. Another carries the signal from automatic dispatching equipment, located at the load dispatcher's office, to the generating station for turbine control.

Included in the basic equipment is a service telephone circuit between each microwave station and an alarm channel. The alarm gives the dispatcher an indication of failure of an RF or relaying function, transfer to emergency power units, or failure of antenna tower obstruction lights.

Power for operation of the microwave equipment is provided by an ac m-g set having either a gasoline or propane engine attached to a common shaft. During normal operation, the motor is supplied with station service power at 120 v. Upon complete failure of station service, or even a dip in voltage beyond a predetermined pilot relay setting, the emergency engine is started by flywheel action. This quick pick-up assures a continuity of power essential for a high degree of system capability.

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Mine-Mouth Station Pays Off

(*Continued from page 59*)

net heat rate will be about 9,900 Btu per kwhr.

Such is the station designed for low-cost operation consistent with reliability. No money had been spent for aesthetic effects, and duplication of equipment for standby has been minimized. As an example, each unit has only two half-size boiler feed pumps, accepting the risk that station load may occasionally be reduced to 60% through the loss of a pump.

Costs Estimated

As many facilities were installed for the second unit and some for the third, any statement of costs must be based upon at least a two-unit plant. Based on actual costs for the first unit and estimates for the second (estimated values apply principally to field labor), the probable cost of the two-unit plant will be:

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Based on demonstrated net capability (350,000 kw) . . . $119 per kw

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These costs include the step-up substation but not the transmission lines to Kansas City.

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Contract approximately 18 months to 2 years. Salary subject to negotiation. Liberal benefits including housing and tax exemption for foreign residence. Dependents may accompany, expenses paid.

Send resume and salary required.

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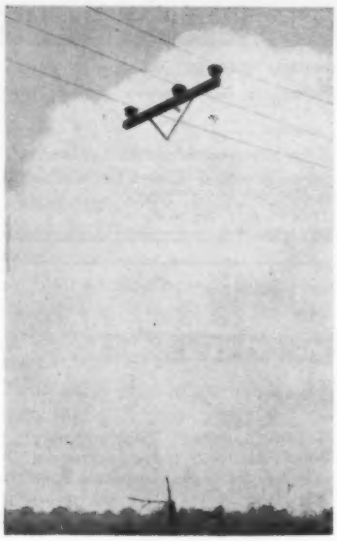
Readers Forum



Cartoonist Comes Close to Nature's Handiwork

"Darn those plastic poles!" says character in cartoon at right. But the photo at left is from a copy of Gulf States Utilities' employee magazine, "Plain Talk." The photo shows results of lightning which disintegrated the pole and showered splinters in all directions

Remote-Controlled Gas Turbine

To the Editor:

In the March 2 issue of Electrical World on page 62—the Manufacturers News section—there appeared an article entitled "Gas Turbine Remote Controlled." Here you are mentioning that Westinghouse 5,000 kw gas turbine will be the "first gas turbine electric power station with completely automatic remote controls."

We would like to advise you that Electricidad de Caracas in Venezuela owns a Brown Boveri gas turbine power plant which is entirely remote-controlled, namely it is controlled from an 11 miles distant point. The El Convento Power Plant has already been in operation for many months.

For this matter, Mr. Pfersdorff from Electricidad de Caracas discussed this station shortly in his remarks during the recent ASME Gas Turbine division meeting in Cincinnati, Ohio.

Z. Stanley Stys
Vice President

Brown Boveri Corp
19 Rector Street
New York 6, N. Y.

No Chafing Dishes?

To the Editor:

We can sympathize with Richard Hoe Osgood (EW, 3/23, p 102). My wife has combed New York City and environs for an electric chafing dish. There ain't none!

L. F. Hickernell
President

American Institute of Electrical Engineers
33 W. 39th St.
New York 18, N. Y.

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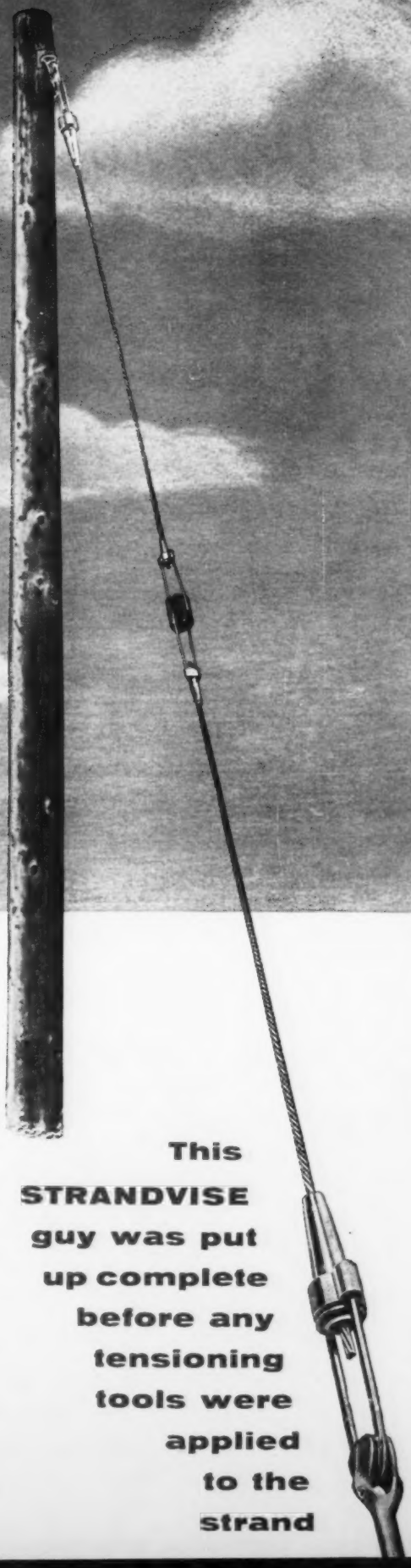
Where is the Guy who put up this guy?

He's doing something else—
maybe he's putting up another one.
Anyway, he did this job all alone
in less than five minutes—
by himself.



STRANDVISE is made
for strand sizes 3/16", 1/4", 5/16", 3/8", and 7/16"
NO MATTER THE GRADE.
Please pick your size, fill in
the coupon and mail it today.

Reliable

A SYMBOL OF INTEGRITY SINCE 1909

Reliable Electric Company
H333 Addison Street
Franklin Park, Ill.

Mr. Reliable:

WE DON'T BELIEVE IT BUT—we want to give STRANDVISE a fair trial. You may send 4 of them size ( ) without charge. Better send your instructions for installing and a catalog-price sheet, too.

Signed_____

Company_____

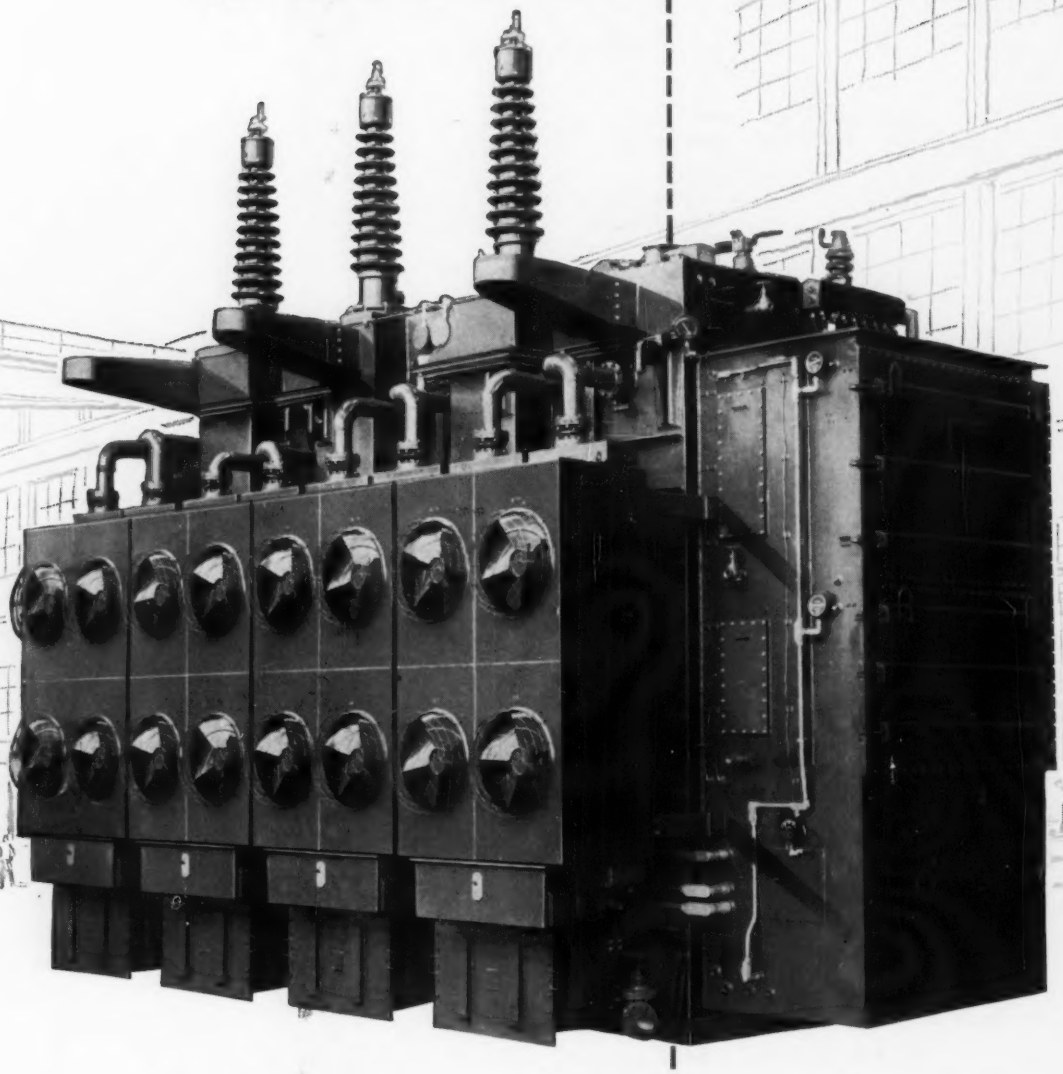
Street No._____

City_____ State_____

In Canada: Hayes Steel Products, Ltd., Merritton, Ont.

This STRANDVISE guy was put up complete before any tensioning tools were applied to the strand

MOLONEY



SPECIALTY OF THE HOUSE

One power transformer coming up! Moloney has specialized in the design and fabrication of dependable transformers to serve all needs of the electric utilities for over 60 years . . . and has established an unsurpassed reputation for quality and performance.

Today, as power companies plan systems operating at higher and higher voltages to efficiently serve their growing demands, Moloney offers complete facilities for the design and construction of power transformers of any size and Kva rating. And along with these most modern facilities which are . . . Built Big to Build Big . . . Moloney offers a comprehensive background of experience and understanding of the power companies operating problems. Give your system the dependability you know you can expect from Moloney. Make it Moloney . . . all along the line.

Moloney Load Tap Changing Transformer Rated 125,000 KVA, Three-Phase, Sixty Cycle Type FOA High Voltage 138,000 Grd. Y Low Voltage 13800/13800 Delta Volts.

MED7-28

MOLONEY ELECTRIC COMPANY

Manufacturers of Transformers for Utilities, Industry, and Electronic Applications

FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA